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DD-98-01
Revision 1

DECONTAMINATION AND DECOMMISSIONING OPERATIONS

WEST JEFFERSON SITE ENVIRONMENTAL MONITORING PLAN

FOR

BATTELLE COLUMBUS LABORATORIES DECOMMISSIONING PROJECT

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PLAN APPROVAL PAGE

This plan, DD-98-01, *West Jefferson Site Environmental Monitoring Plan for Battelle Columbus Laboratories Decommissioning Project,* has been reviewed and approved by the following:

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WEST JEFFERSON SITE ENVIRONMENTAL MONITORING PLAN FOR BATTELLE COLUMBUS LABORATORIES DECOMMISSIONING PROJECT

1.0 Purpose and Scope

1.1 An Environmental Monitoring Plan

The Battelle Columbus Laboratory Decommissioning Project's (BCLDP) Environmental Monitoring Plan (EMP) formulates and describes this project's program during decontamination and decommissioning (D&D) activities to: 1) evaluate control measures for prevention of releases of radioactive materials to the environment, 2) characterize the nature and amount of any release, 3) assess the transport and fate of materials released in the environment, 4) estimate doses to the public or reference individuals from releases of these materials, and 5) ensure that governmental limits for protection of the public and the environment are met. In addition, non-radiological parameters are monitored periodically according to regulatory permit requirements and established monitoring programs.

The EMP describes the collection and analysis of samples or direct measurements of environmental media. The EMP includes planning for 1) effluent monitoring and 2) environmental surveillance. Effluent monitoring is performed by the appropriate D&D staff at potential points of release to the environment of radioactive material or other regulated pollutants. Environmental surveillance consists of sampling and analyzing environmental media on and off the BCLDP sites to detect and quantify potential contaminants and to assess their environmental and public health effects.

The EMP provides the means for assessing the effects of D&D operations on public health and safety and on the environment. The basic objective of the EMP is to evaluate the effectiveness of the BCLDP operations so that effluent levels are maintained as low as reasonably achievable and well within applicable standards.

Although the BCLDP is not contractually required to comply with government requirements, the primary objective is to ensure that the D&D activities at the Battelle Columbus Laboratories are in agreement with various government regulations and guidelines applicable to this site.

Environmental monitoring under the BCLDP includes routine monitoring of specific emission sources, general environmental surveillance of liquid and atmospheric media, and contingency plans for enhanced monitoring at the West Jefferson North Research Area. In addition, samples of various environmental media, including air, surface water, groundwater, grass, fish, food crop[s], sediment, and soil are periodically collected, analyzed, reviewed, and reported to the public in an annual Site Environmental Report (SER).

Although this EMP establishes the basic requirements and responsibilities for effluent and environmental monitoring, specific activities to meet these requirements are included in Environmental Monitoring (EM), Radioanalytical Laboratory (RAL), and other BCLDP components, administrative, and operating procedures.

1.2 Effluent Monitoring

Effluent monitoring is the collection and analysis of airborne and liquid effluents for the purpose of characterizing and quantifying contaminants, assessing the exposure of members of the public to radiation and chemical sources, providing a means to control effluents at or near the point of discharge, and demonstrating compliance with applicable government standards.

Identifying potential radiological source terms for sampling, analysis, review, and reporting is based on 1) an evaluation of the decontamination and decommissioning activities being performed, 2) criteria from the U.S. Department of Energy (DOE) 5400/231.1 series[a], and 3) identification of key radionuclides that most likely contribute to the radiation dose from the airborne release.

Potential liquid source terms include sprays and waste water from decontamination activities, steam condensates, and laboratory drains. Effluent from decontamination operations, as part of the facilities overall permitted discharges, will also be monitored according to established schedules.

Stack air samplers will continuously monitor the exhaust stack emissions from the potential source contributors (i.e., JN-1, JN-2) to assess the effectiveness of the systems controlling airborne emissions.

1.3 Environmental Surveillance

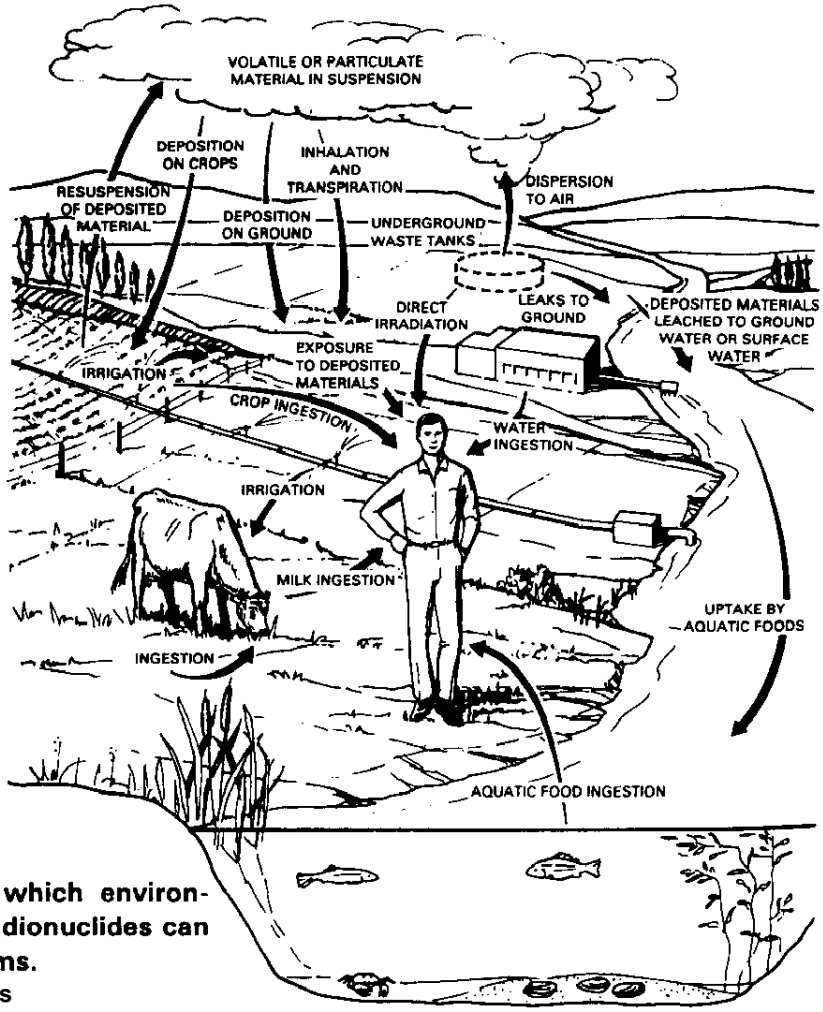
Environmental surveillance is the collection and analysis of samples, or direct measurement, of air, water, soil, foodstuffs, biota, and other media from the sites and their environs to determine compliance with applicable standards and permit requirements and to assess the radiation and chemical exposure of members of the public and its effect, if any, on the local environment.

Particular environmental pathways are important because they present a potential route for radioactive and hazardous substances and materials to reach the human population. Figure 1 presents the primary exposure pathways for an environmental release. The significance of each pathway is determined from measurements and calculations that estimate the amount of material that is transported through the

a The EMP's compliance with DOE requiremenets ensures concurrent compliance with the BCLDP NRC license requirements.

environment and eventually taken up by humans. The results of environmental pathway analysis are compared to appropriate public health and environmental standards.

Figure 1. Primary Exposure Pathways for an Environmental Release



Major pathways by which environmentally dispersed radionuclides can affect living organisms.
Courtesy of Battelle Press

1.4 An Environmental Occurrence

Another term employed in the EMP that requires definition is "an environmental occurrence." An environmental occurrence is any sudden or sustained deviation from a regulated or planned performance during a decontamination or decommissioning operation that has environmental and compliance significance. Effluent monitoring needs to be sensitive enough to detect any such occurrence; if the release exceeds public health or environmental standards, reporting and notification are called for.

1.5 Radiation Protection and Environmental Standards, Recommendations, and Guidance

Normally, "radiation protection standards, recommendations, and guidance[1]" are defined separately from other "environmental standards, recommendations, and guidances." Radiation protection standards specify limits on exposure that are regarded as necessary for protection of public health and should be met, except in the case of accidents or emergencies, regardless of cost. As used in this document, the terms "radiation protection standards, recommendations, or guidance" refer to standards, recommendations, or guidance that are generally applicable to all sources of exposure, exclusive of natural background radiation and deliberate medical practices.

The term "environmental radiation standards or guidance" specifies limits on exposure for particular practices or sources. Most "environmental radiation standards and guidances" are judgmental and are based on the "as low as reasonably achievable" (ALARA) principle; that is, they are judged to be reasonably achievable taking into account technical, economic, and social factors. Therefore, "environmental radiation standards or guidance" are not based on a limitation of health risk *per se.* The one exception is the U.S. Environmental Protection Agency (EPA) standard for airborne radionuclide emissions in 40 CFR Part 61, which is based on limits on lifetime risk for maximally exposed individuals and average individuals in large population groups.

Environmental monitoring standards are defined primarily by the EPA, the Occupational Safety and Health Administration, and associated state agencies. These standards are detailed in applicable sections of 40 CFR and 29 CFR pursuant to regulations promulgated under the Clean Water Act, Clean Air Act, Safe Drinking Water Act, Comprehensive Environmental Response and Liability Act, Resource Conservation and Recovery Act, and the Occupational Safety and Health Act (see Table 1).

Table 1. Federal and State Environmental Statutes & Regulations Applicable to BCLDP

Regulator	Regulation	Description	Compliance Status
EPA	**Comprehensive Environmental Response, Compensation & Liability Act**	Provides the regulatory framework for remediation of releases of hazardous substances and remediation of inactive hazardous waste disposal sites.	BCLDP monitors but have had no releases of hazardous substances that required notification under this act.
Council for Environmental Quality/DOE	**National Environmental Policy Act**	Requires federal agencies to follow a prescribed process to evaluate the impacts on the environment of proposed major federal actions and alternatives.	Activities performed are consistent with the existing BCLDP Environmental Assessment and Finding of No Significant Impact.
EPA	**Resource Conservation & Recovery Act**	Governs the generation, storage, handling and disposal of hazardous waste.	RCRA compliance is the responsibility of Battelle's Hazardous Waste Operations group. Battelle is not operating as a hazardous waste treatment, storage, or disposal facility.

Table 1. Federal and State Environmental Statutes & Regulations Applicable to BCLDP (continued)

Regulator	Regulation	Description	Compliance Status
EPA	**Clean Air Act**	Regulates the release of air pollutants through the use of permits and air quality limits.	Administered in Ohio by the OEPA
EPA	**Clean Water Act**	Seeks to improve the quality of surface waters by implementing a permitting program and establishing water quality standards.	Administered in Ohio by the OEPA
EPA	**Safe Drinking Water Act**	Establishes minimum drinking water standards and monitoring requirements.	Administered in Ohio by the OEPA
EPA	**Toxic Substance Control Act**	Regulates the manufacture, use and distribution of all chemicals.	Administered by the USEPA
EPA	**Federal Facility Compliance Act**	Requires that DOE facilities provide comprehensive data to EPA and state regulatory agencies on mixed-waste inventories, treatment capacities, and treatment plans for each site. The act ensures that the public will be informed of waste treatment options and encourages active public participation in the decisions affecting federal facilities.	Battelle provides OEPA with an annual update of the BCLDP Site Treatment Plan.
US Fish & Wildlife Service	**Endangered Species Act**	Establishes threatened and endangered categories of wildlife and provides protection for critical habitats.	The State of Ohio lists 5 species of fish (including 1 federal endangered) and 8 species of mollusks (including 2 federal endangered) identified along Big Darby Creek.
NPS	**Federal Wild & Scenic Rivers Act**	Provides preservation of wild and scenic free-flow rivers in their natural condition.	The Big Darby Creek has been designated as a component of the National Wild & Scenic Rivers system. At the present time, BCLDP activities are not subject to the requirements under this act, because they do not affect the free-flowing nature of the Big Darby Creek.
Advisory Council on Historic Preservation	**National Historic Preservation Act**	Identifies, evaluates, and protects historic properties eligible for listing in the National Register of Historic Places.	The Resource Protection and Review Department of the Ohio Historic & Preservation Office has determined that BCLDP facilities are not eligible for inclusion into the National Register of Historic Places
EPA	**Federal Insecticide, Fungicide, & Rodenticide Act**	Governs the manufacture, use, storage, and disposal of pesticides and herbicides, as well as pesticide containers and residues.	This act is not applicable to BCLDP. Pesticides used in BCLDP areas are USEPA registered and purchased from a registered establishment.
EPA	**Superfund Amendments and Reauthorization Act, Title III**	Requires reporting of emergency planning information, hazardous chemical inventories, and environmental releases to federal, state and local authorities.	Battelle reports under EPCRA 311-312: Material Safety Data Sheet/Chemical Inventory, which applies to aboveground and underground tank storage of #2 fuel oil, gasoline, kerosene for backup fuel for boilers and emergency generators, and nitrogen (cryogenic liquid) storage in an aboveground storage tank for use in laboratories.
DOE	**Executive Order 11988, *Floodplain Management***	Established to require federal agencies to avoid, to the extent possible, adverse impacts associated with the occupancy and direct or indirect support of floodplain development wherever there is a practical alternative.	None of the buildings within BCLDP jurisdiction are located in the 100-year floodplain for Big Darby Creek. The soil remediation planned for the abandoned filter bed area has been designed to minimize impact to or within the floodplain.
DOE/US Army-COE	**Executive Order 11990, *Protection of Wetlands***	Established to mitigate adverse effects to wetlands caused by destruction or modification of wetlands and to avoid construction in wetlands wherever possible.	BCLDP Operations should not impact any wetland areas.

2.0 Environmental Monitoring Guidance

Numerous government orders, standards, guidance, and criteria influence an EMP. They determine the content and form of an EMP, and they also influence its intent. In addition, documents published by the American National Standards Institute (ANSI) and the

American Society of Mechanical Engineers (ASME) describe specific radiation instrument standards and support certain aspects of the EMP, specifically quality assurance.

2.1 Department of Energy Orders

2.1.1 DOE Order 414.1-1A, Quality Assurance

DOE Order 414.1-1A[2] specifies quality assurance requirements for DOE projects and provides guidance in establishing a Quality Assurance Program (QAP). The QAP "assigns responsibilities and authorities, defines policies and requirements, and provides for the performance and assessment of work."

2.1.2 DOE Order 435.1, Radioactive Waste Management

DOE Order 435.1[1] ensures that all DOE radioactive waste is managed in a manner that is protective of the worker and public health and safety, and the environment.

2.1.3 DOE Order 5400.1/231.1

DOE Order 5400.1[3]/231.1 establishes "environmental protection program requirements, authorities, and responsibilities for DOE operations for assuring compliance with applicable federal, state, and local environmental protection laws and regulations, executive orders, and internal department policies."

2.1.4 DOE Order 5400.5

DOE Order 5400.5[4] establishes "standards and requirements for operations of the DOE and DOE contractors with respect to protection of members of the public and the environment against undue risk from radiation."

2.1.5 *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance*, DOE/EH-0173T

The DOE *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance*[5] (hereafter called the regulatory guide) establishes elements of a radiological effluent monitoring and environmental surveillance program considered acceptable to DOE, in support of DOE 5400.5 (Radiation Protection of the Public and the Environment) and DOE 5400.1 (General Environmental Protection Program).

2.1.6 DOE Order 5484.1, Environmental Protection, Safety, and Health Protection Information Reporting Requirements

DOE Order 5484.1[6] establishes reporting requirements for an EMP.

2.1.7 DOE Order 5480.1A, Radiation Protection Standards

DOE Order 5480.1A[1] establishes radiation dose limits. The limits are consistent with current ICRP and NCRP recommendations and represent the first use in the United States of effective dose equivalent.

2.1.8 DOE Order 5400.5, Chapter II, Drinking Water Pathway Only

DOE Order 5400.5, Chapter II [5] establishes radiation dose limits for drinking water supplies.

2.1.9 DOE Order 5400.5, Chapter IV, Residual Radioactive Material

DOE Order 5400.5, Chapter IV[4] addresses 1) release of contaminated property for unrestricted use by the public, 2) interim storage of residual radioactive material, and 3) long-term management of uranium, thorium, and their decay products.

2.2 Nuclear Regulatory Commission Rules and Guidance

2.2.1 NUREG/CR-5212, Emergency Environmental Sampling and Analysis for Radioactive Material Facilities

NUREG/CR-5212[7] provides information that could be used in an environmental sampling and analysis program for emergency or non-routine events. Sample collection and measurement locations, sample collection procedures, and quality assurance programs are applicable to this project.

2.2.2 10 CFR Part 20, Subpart D, Radiation Dose Limits for Individual Members of the Public

10 CFR Part 20, Subpart D[8,a] establishes radiation dose limits for the public.

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a Permission to use material from "The Health Physics and Radiological Health Handbook" Revised Edition, Shlein, B. Ed. Scinta Inc., Silver Spring, MD 20902, 1992, has been granted.

2.3 American Society of Mechanical Engineers (ASME) and American National Standards Institute (ANSI)

2.3.1 ASME NQA-1a, Quality Assurance Program Requirements for Nuclear Facilities

The BCLDP Quality Program is based, in part, on the requirements of ASME NQA-1a[9]. This EMP has been prepared in accordance with the BCLDP Quality Manual and Quality Procedures, applying a graded approach as specified in procedure QD-AP-2.1

2.3.2 ANSI N42.18-1974, Specifications and Performance of Onsite Instrumentation for Continuously Monitoring Radioactivity in Effluents

ANSI N42.18-1974[10] applies to continuous monitors that measure normal releases, detect inadvertent releases, show general trends, and annunciate radiation levels that have exceeded predetermined values.

2.4 Environmental Protection Agency

2.4.1 EPA Standards in 40 CFR Part 61, National Emission Standards for Hazardous Air Pollutants

40 CFR Part 61[11] establishes limits on the annual effective dose equivalent for DOE facilities emitting any radionuclide, other than radon, and other pollutants, except disposal facilities.

2.4.2 40 CFR Part 141, EPA Standards for Community Drinking Water Systems

40 CFR Part 141[1] applies 1) to public or private water systems with at least 15 service connections or serving at least 25 persons and 2) at the tap rather than at the source.

2.4.3 Ohio Environmental Protection Agency

The Ohio EPA has established discharge limitations as part of its National Pollutant Discharge Elimination System (NPDES) permit for the West Jefferson facility. The discharge limitations are based on daily and monthly concentration and loading factors.

In addition, the Ohio EPA has established maximum contaminant levels for inorganic and organic chemicals and microbiological contaminants which must be met at the West Jefferson facility. The facility operates as a non-transient, non-community water supply.

2.5 Legislative Acts

2.5.1 Endangered Species Act

The BCLDP recognizes the importance of wildlife. Sampling procedures specify that care should be taken to avoid the collection of any endangered species. Any wildlife species that are inadvertently captured during sample collection along Big Darby Creek are to be released and returned to the water.

At the West Jefferson site, the following endangered species have been identified:

Endangered Fish

- Goldeye *(Hiodan alosoides)*
- Northern Brook Lamprey *(Ichthyomyzon fossor)*
- Northern Madtom *(Noturus stigmosus)*
- Scioto Madtom *(Noturus trautmani) (also federal endangered)*
- Spotted Darter *(Etheostorna maculatum)*

Endangered Mollusks

- Clubshell *(Pleurobema clava) (also federal endangered)*
- Elephant-ear *(Elliptio crassidens)*
- Northern riffleshell *(Epioblasma torulosa rangiana) (also federal endangered)*
- Pocketbook *(Lampsilis ovata)*
- Rabbitsfoot (*Quadrula cyclindrical*)
- Rayed Bean *(Villosa fabalis)*
- Snuffbox *(Epioblasma triquetra)*
- Washboard *(Megalonaias nervosa)*

2.5.2 Federal Wild and Scenic Rivers Act

The Big Darby Creek was designated as a component of the National Wild and Scenic River System in 1994. At the present time, BCLDP activities are not subject to the requirements under this act, because they do not affect the free-flowing nature of the Big Darby Creek. Additional state or local requirements may be implemented in the future.

3.0 Criteria for Environmental Monitoring Plans

3.1 DOE

The DOE provides criteria for effluent monitoring and environmental surveillance through DOE/EH-0173T.[5] The BCLDP EMP is designed to meet these criteria.

3.2 EPA

In addition to the criteria above, the EMP will use airborne effluent monitoring and environmental surveillance sampling and analyses techniques to meet the requirements of EPA's National Emission Standards for Hazardous Air Pollutants[11], as well as NRC's 10 CFR Part 20, Appendix B.[12]

3.3 Non-Radiological Monitoring

The criteria for the non-radiological monitoring is based on U.S. EPA, Ohio EPA, and DOE protocol and programs established by Battelle Columbus Laboratories.

4.0 The Technical Basis for the BCLDP Environmental Monitoring Plan

4.1 Operational Background and History

4.1.1 Historic Perspective

Battelle Memorial Institute initially performed work for the Office of Scientific Research and Development during 1942 under Contract No. OEMsr-85. In April 1943, work was performed for the United States under Contract No. W-7405-ENG-92. This was work primarily under the jurisdiction of the War Department as part of the Manhattan Engineering District Project. Subsequent work was done under the DOE and its predecessor organizations, Energy Research and Development Administration and the Atomic Energy Commission. Battelle Memorial Institute's facilities are operated under a Nuclear Regulatory Commission (NRC) license (No. SNM-7) and in compliance with all applicable state and federal regulations. Operations were conducted at the West Jefferson site (Figures 2 and 3) located approximately 15 miles west of the King Avenue site on the Georgesville-Plain City Road, one mile south of Interstate 70. Battelle completed almost 1,000 government-related projects involving nuclear materials in its 43-year association with U.S. government agencies.[13]

Figure 2. Regional Map for King Avenue and West Jefferson Sites

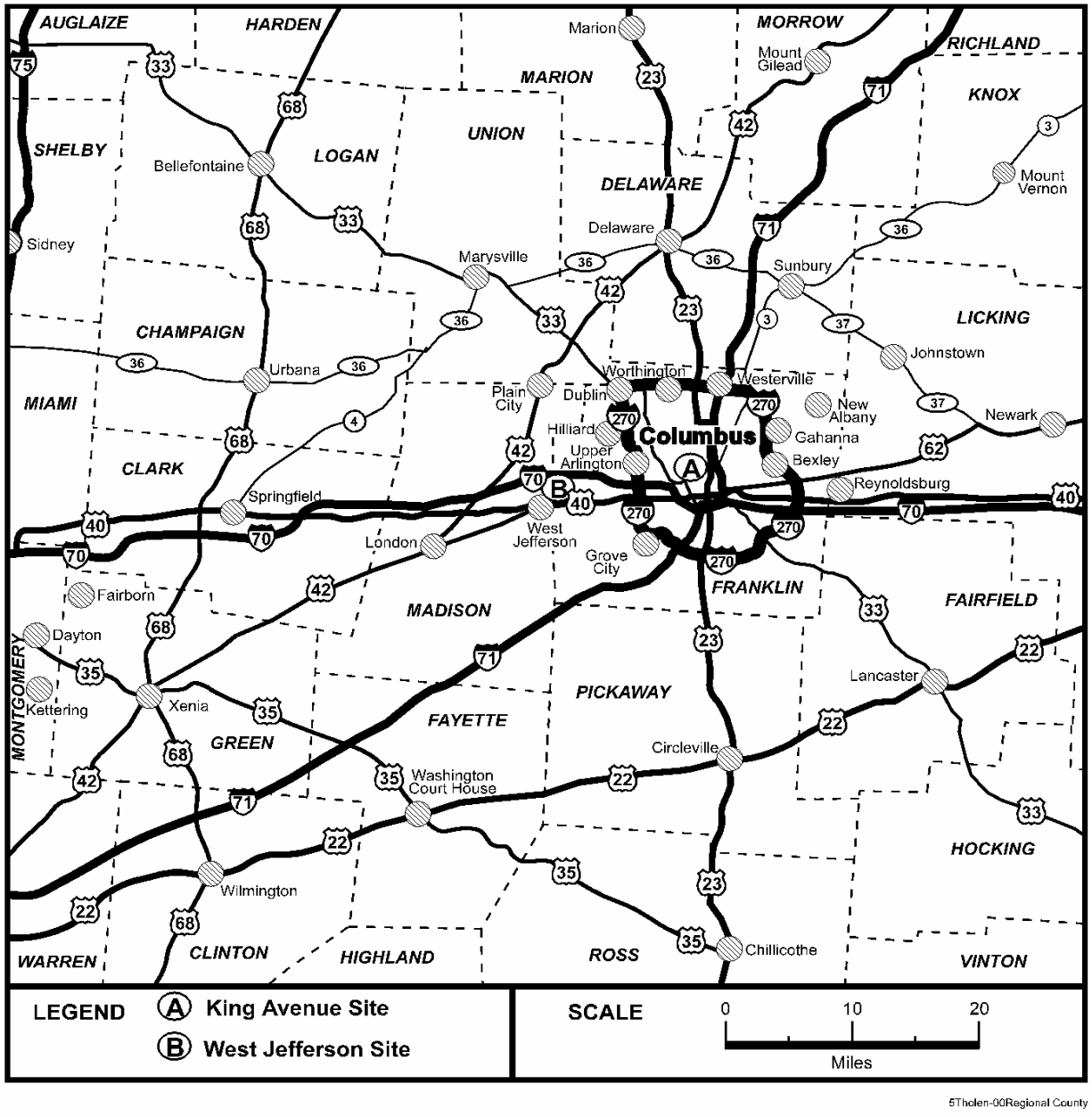
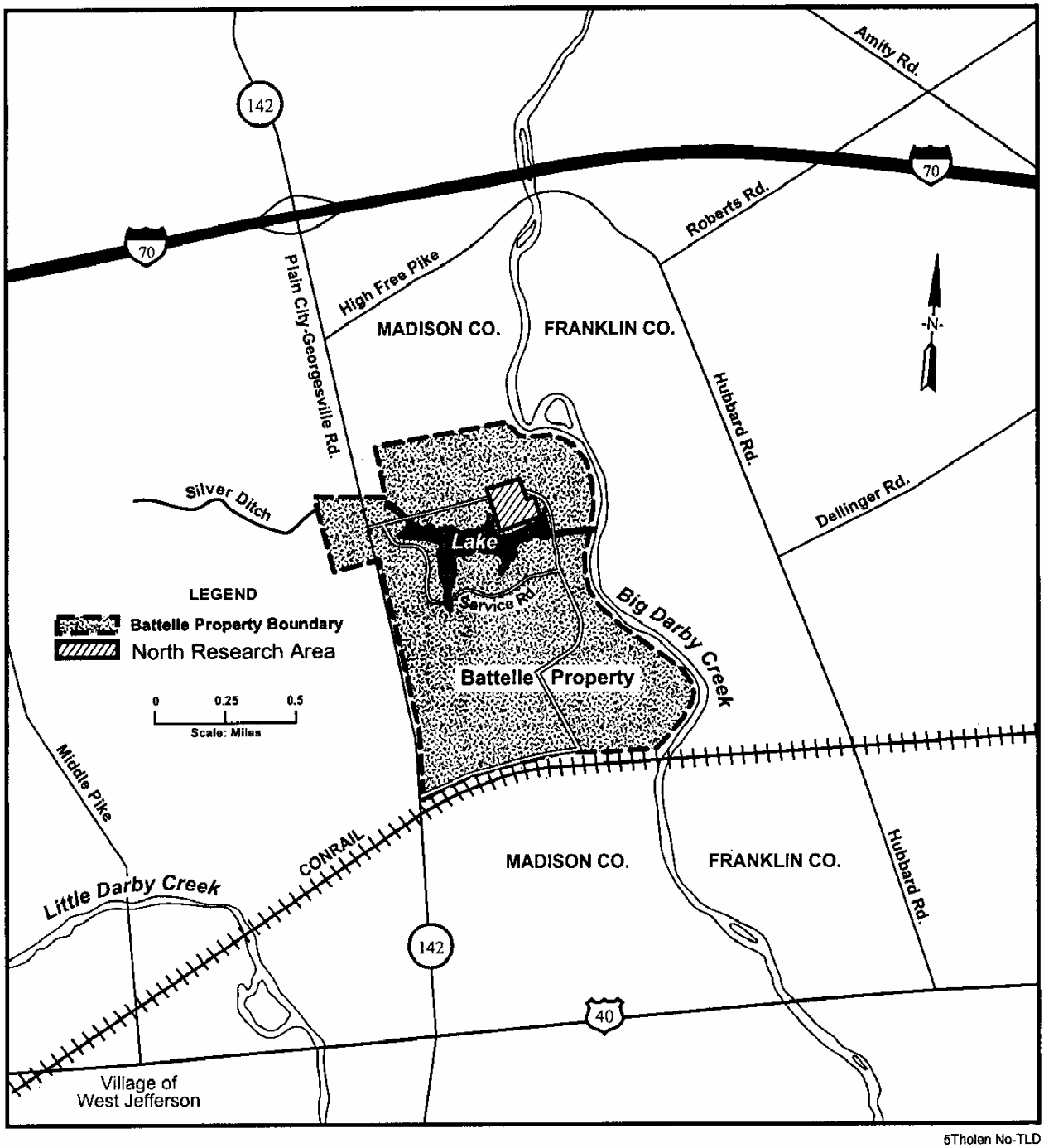


Figure 3. Local Vicinity Map of North Research Area—West Jefferson Site



The West Jefferson site has three primary research areas: the North Research area which consists of a ten-acre fenced area in the northern portion of the 1,000-acre plot; the Middle Area consisting of the Medical Research and Evaluation Facility; and the Engineering area in the southeastern portion of the site. Radioactive materials had been used in all

the buildings at the north area. Building JN-1, the Hot Cell Laboratory, consists of a large high-energy cell and a connecting fuel storage pool, four smaller cells, and supporting facilities. The high-energy cell and pool were capable of handling complete power reactor fuel assemblies. The smaller cells are the high-level and low-level cells, two mechanical test cells, and a segmented alpha gamma cell. Building JN-2 was designed and constructed for use as a critical assembly laboratory and operated from 1957 through 1963. Battelle terminated the operating license in 1970 when project work was ended. The Battelle Research Reactor, JN-3, operated from October 29, 1956, to December 31, 1974. Dismantling was completed during 1975 and the license changed to a possession-only status.

Building JN-4 was built in 1960 for plutonium research and processing. These operations were terminated in 1978 and the laboratory portion was dismantled in 1985. This retired plutonium facility (JN-4) is now operating as a Hazardous Materials Research Center (non-radioactive). In the South Area of the West Jefferson Site, Buildings JS-1, JS-10, and JS-12 had a history of uranium activities: JS-1 for military fuel fabrication and JS-10 and JS-12 for ballistics tests of depleted uranium components.

4.1.2 Present Decommissioning Activities

DOE notified Battelle in March 1984 that it intended to allow its contract to expire. DOE is contractually obligated to remove the contamination so that the owners can use the facilities without radiological restrictions.[14] Under provisions of the Surplus Facilities Management Program, the DOE proposed funding the decommissioning of contaminated facilities and associated premises belonging to Battelle Memorial Institute. The nuclear research facilities, consisting of Buildings JN-1, JN-2, and JN-3 at the West Jefferson Site, are currently undergoing active D&D activities under DOE. In addition, some packaging of transuranic (TRU) waste is underway for shipment off site. These activities are referred to as the Battelle Columbus Laboratories Decommissioning Project (BCLDP).

Radioactive contamination in Building JN-1, JN-2, and JN-3 consists of mixed fission products, activation products, uranium, thorium and suspect transuranics.[14,15] There is a very small amount of nuclear fuel in one of the hot cells and in two casks; and there are nuclear fuel dust/fragment deposits on the surfaces of the hot cells, hot cell equipment, and on materials stored in casks and barrels (see Table 1). All operational materials, fuel remnants, special nuclear materials, and stored operational wastes were removed during the phase-out of operations in the buildings.

Table 2. Radiological Significance of West Jefferson North Buildings

Building	Major Survey Results
JN-1	Interior of hot cells and storage rooms highly contaminated with fission products; fixed contamination along exterior surfaces of the mezzanine, top of HEC, other rooms, and sumps. Storage casks and barrels of highly contaminated waste in an attached Waste Storage Building.
JN-2	No significant surface contamination; a few spots of fixed contamination in the high bay and in the Radioanalytical Laboratory.
JN-3	No significant surface contamination; fixed contamination throughout. Currently, the only licensed activity conducted in JN-3 is for the storage of waste awaiting shipment for burial.

4.2 Decontamination and Decommissioning Activities

The approach for decommissioning these facilities is to decontaminate and remove radioactive or contaminated (PCB or asbestos) facilities, equipment, materials, fluids, and/or soil from the site to permit reuse of the property. For the facilities in question, this will generally involve dismantling and/or removing equipment, decontaminating building structures, appropriately restoring and/or demolishing the buildings, and removing and disposing of contaminated soil as a low-level radioactive waste.[14]

4.3 Potential Source Terms

4.3.1 West Jefferson Site—Airborne Releases

The primary potential source of airborne releases for the West Jefferson site is residual fuel contamination from destructive and non-destructive testing conducted in several cells throughout the JN-1 Hot Cell Laboratory.[15] A gross estimate of the total contaminant inventory at West Jefferson North is 3,000 curies (this estimate applied at the end of FY2002).

4.3.2 West Jefferson Site—Liquid Effluent Discharges

Following treatment, all sanitary systems for the West Jefferson North and Middle sites have a common discharge point (EW-1) to Big Darby Creek. See Figure 6 for the location.

4.3.3 West Jefferson Site—Soil Contamination

There are general areas of soil with elevated levels of radioactivity at the West Jefferson facility. One area is a storm sewer outfall (SS-JN-1-4) that

collects storm water runoff from the roofs of buildings JN-1 and JN-4 and surface drains at the West Jefferson North Research Area. Outfall SS-JN-1-4 was remediated in 1994 and is routinely sampled as part of the ongoing site environmental monitoring program (see sediment sampling station ED-1 in Figure 7 for the location). This outfall remains active, and the area will not be submitted for free release until after building JN-1 demolition is complete.

Two retired filter beds, constructed as a secondary control to filter particulates from the wastewater effluent, at the West Jefferson facility, contain Cs-137, Co-60, and Am-241 (Table 4). The 10-foot deep beds are located between the dam service road and Big Darby Creek and involve less than 2,300 m^3 (81,000 ft^3) of soil. Data from samples collected during 2000 and 2002 showed concentrations above background in the large bed (105 by 60 feet) ranging from 0.3 to 205 pCi/g, while those in the small bed (75 by 35 feet) ranged from 0.2 to 25 pCi/g. The maximum concentrations were measured near the surface. Resampling results revealed contamination levels at approximately the same order of magnitude as historical data indicated. These filter beds are located inside the flood plain of the Big Darby Creek. The contamination is presently immobile (see Table 4). Ground water monitoring in the vicinity of the filter beds showed no release of radioactivity. Another area of concern is subsurface contamination, located within the confines of the north site perimeter fence, about 75 feet east of JN-4.

The BCLDP is in the process of deploying Well Injection Depth Extraction (WIDE) innovative technology. The intent of WIDE deployment is in-situ subsurface remediation of cesium contamination and reduction of soil removal.

Table 3. Radiological Analyses of Ground Water at the West Jefferson Site in 2000

Well Identification[a]	Location	pCi/L	
		Gross alpha ±2 sigma[b]	Gross beta ±2 sigma[b]
JN-Active Supply Well	Nuclear Sciences Area: East of JN-1	8.93 ± 3.17	2.87 ± 1.35
JM-Active Supply Well	West Jefferson Middle Area	7.99 ± 3.42	5.00 ± 1.51

Table 3. Radiological Analyses of Ground Water at the West Jefferson Site in 2000 (continued)

Well Identification[a]	Location	pCi/L	
		Gross alpha ±2 sigma[b]	Gross beta ±2 sigma[b]
JS-Active Supply Well	West Jefferson Middle South Area	6.35 ± 3.06	4.93 ± 1.49
CO3	East of JN-4	8.39 ± 4.95	8.43 ± 2.38
CO9	Storm Sewer Outfall	8.77 ± 4.76	30.00 ± 3.42
C16	SE of JN-2	7.97 ± 4.74	3.80 ± 2.00
100	SE of Filter Bed	13.30 ± 5.42	5.98 ± 2.13
101	E of Filter Bed	18.80 ± 5.12	14.30 ± 2.40
103	SE of Filter Bed	11.10 ± 5.99	13.30 ± 2.76
110	W of Filter Bed	20.90 ± 6.96	15.30 ± 2.73
116	N of Filter Bed	28.30 ± 7.67	16.50 ± 2.78
118	E of Filter Bed	26.00 ± 7.26	22.40 ± 3.06
150	Storm Sewer Outfall	7.73 ± 4.47	6.25 ± 2.18
155	Storm Sewer Outfall	6.36 ± 4.59	6.53 ± 2.23
168	Storm Sewer Outfall	9.38 ± 5.89	19.90 ± 3.25
172	Storm Sewer Outfall	14.70 ± 6.52	27.70 ± 3.54
206	S of JN-3	8.22 ± 5.15	7.60 ± 2.33
300	SE of JN-4	7.94 ± 23.10	11.70 ± 2.63
306	E of JN-4	9.71 ± 4.67	8.76 ± 2.31
506	W of JN-3	13.10 ± 6.17	8.95 ± 2.45
601	W of JN-1	19.10 ± 5.61	10.40 ± 2.29

[a] Adapted from Battelle BCLDP, "BCLDP Site Environmental Report for Calendar Year 2000 on Radiological and Non-Radiological Parameters."

[b] Minimum Detection Limit for gross alpha is 1.0 pCi/L; for gross beta is 2.9 pCi/L.

4.3.4 West Jefferson Site—Ground Water

4.3.4.1 Ground Water Monitoring Requirements

The ground water sampling program is designed generally in accordance with Ohio Administrative Code (OAC) 3745-54-92, *Ground Water Protection Standard*. Although the north area is not regulated by this standard at the present time, the rationale for ground water monitoring will be applied. In addition, although not directly applicable at this time, this

approach will satisfy all requirements from DOE Order 5400.1, Chapter 4, "Ground Water Monitoring Program"[3] and DOE Order 5400.5, *Radiation Protection of the Public and the Environment*.[4]

4.3.4.2 Ground Water Monitoring

Routine collection of ground water samples for radiological and chemical analysis has been conducted at the West Jefferson facility in 18 shallow monitoring wells (generally 9 to 35 feet deep) and three drinking water supply wells (only one of which is in the North Area) at least annually since 1989 in all wells and will continue. See Figures 4 and 5 for well locations, and Table 3 for monitoring data for the North Area.

- Of the 18 monitoring wells, the highest activities are shown in wells 101, 103, 110, and 118 where radioactivity remains in a former remediated filter bed.[14] The highest combined alpha and beta activity is in well 110. This area has been recommended for further remediation in the *Final Assessment of the Radiological Status of Battelle's Nuclear Sciences Area*, dated January 1991.[17] Concentrations of radionuclides in the filter beds are summarized in Table 3. Wells C09, 168, and 172 are located to the east of the Nuclear Sciences area near the sewer outfall, where Cs-137, Co-60, Am-241, and Pu-239/240 have been measured. Wells 206 and 506 are located to the south and west of JN-3.

- During the last half of CY 1995, an environmental geophysics study was conducted at the remediated filter bed area at the West Jefferson site. The study was conducted to define the hydrogeologic framework, characterize potential contamination pathways, and identify possible leakage points in buried pipelines and drainage tile. A total of six shallow piezometers were installed near the retired filter bed area during September of CY 1995.

  The six new wellpoints were sampled on October 10, 1995, and received gamma spectroscopy analyses. Results from the analyses showed there were no radionuclides present. An additional sampling event of the same six wellpoints conducted on June 5, 1996, yielded identical results.[18]

- The ground water located adjacent to the underground storage tanks located near JN-1 and JN-4 will be sampled annually. The samples will be tested for radiological parameters and PCBs.

Figure 4. North Site Ground Water Monitoring Wells

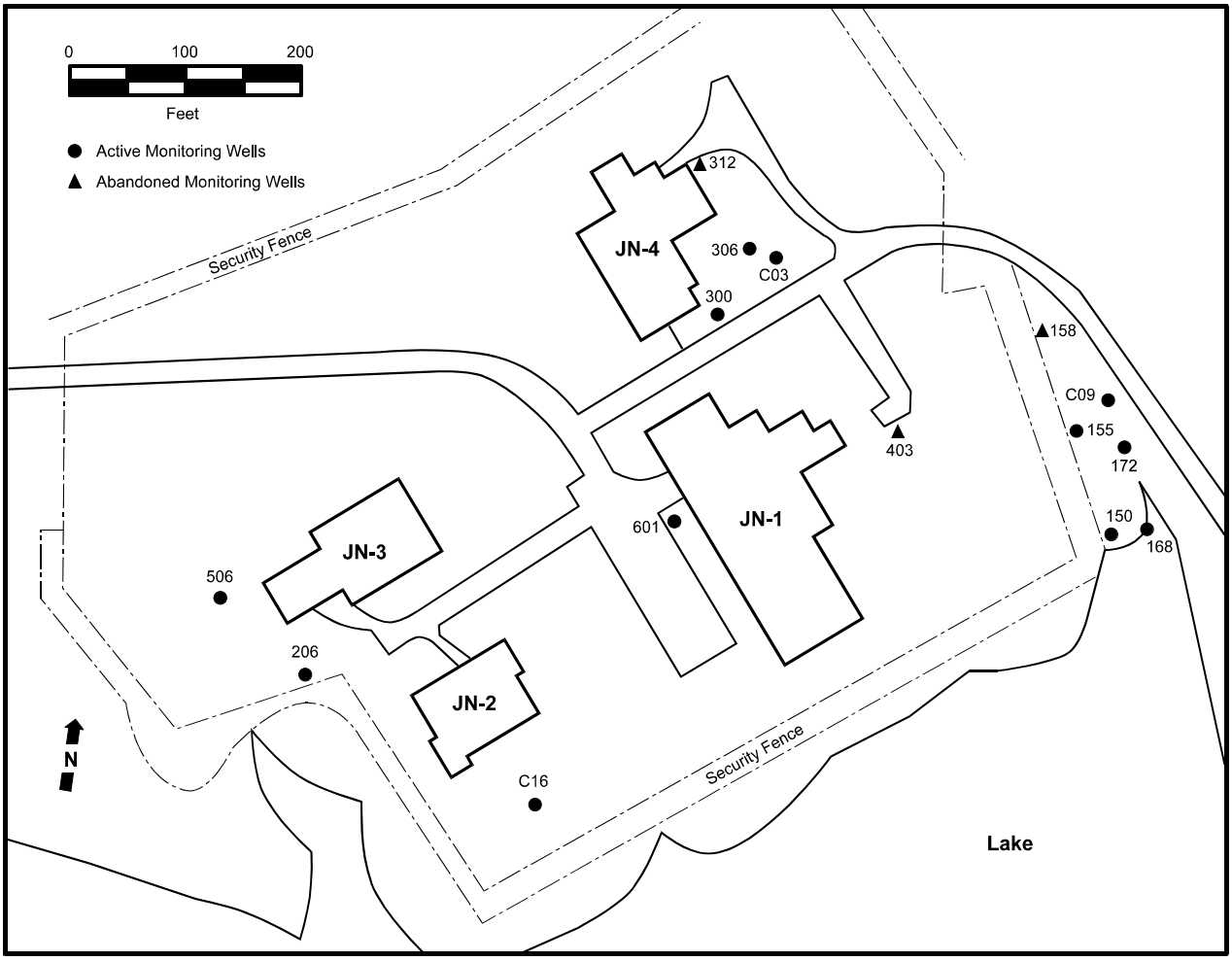


Figure 5. Remediated Filter Bed Area

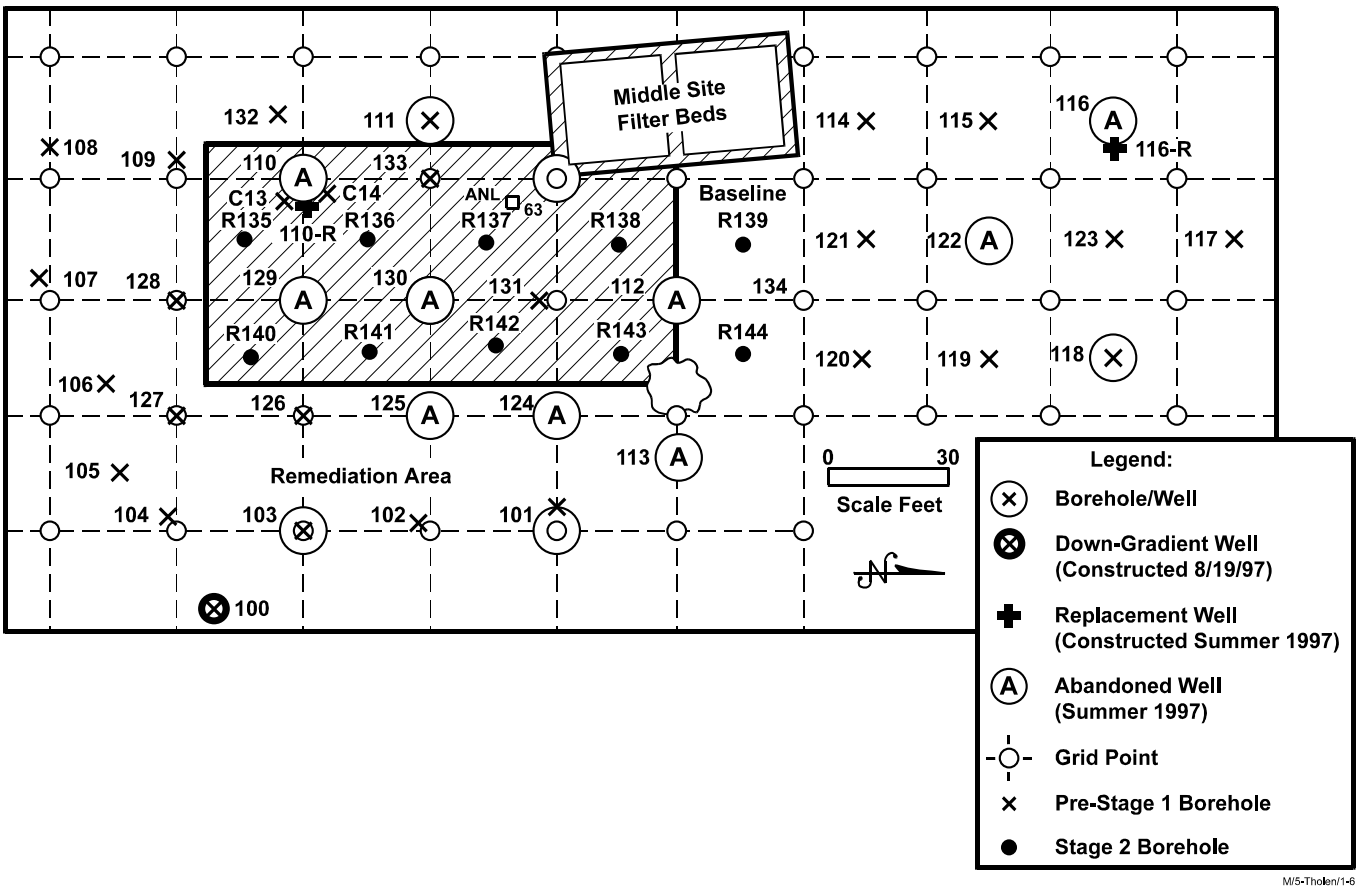


Table 4. Radionuclides in Media of Filter Beds (Historical Data—1988)

Radionuclide[a]	Large Filter Bed[b] (pCi/g) Maximum Concentration	Small Filter Bed[c] (pCi/g) Maximum Concentration	Activity of Both Beds (Ci x 10^{-4})	CERCLA Reportable Quantity (Ci)
Cs-137	223	32	5.5	1
Co-60	1.3	0.6	10.1	10
Am-241	7.6	0.5	10.6	0.01

[a] Filter beds, located between the service road to JN-4 and Big Darby Creek were constructed as a secondary control to filter particulates from sanitary sewer effluent water for 20 years. In 1980, portions of bed media were removed, and clean sand was backfilled and blended with remaining filter media in 1982 and covered with soil.

[b] Approximately 105 by 60 by 10 feet deep.

[c] Approximately 75 by 35 by 10 feet deep.

4.3.4.3 Non-Radiological Program

The drinking water system at the West Jefferson site is monitored under Ohio EPA regulations, which regulate all public water supplies. Because this is a non-transient, non-community water supply, Battelle is required to perform various tests. Monitoring parameters include total coliform for microbiological contamination on a quarterly basis, and VOCs, SOCs, asbestos, nitrates, MCL inorganics, copper, and lead on a schedule ranging from annual to every three years. The drinking water system has consistently met water quality monitoring requirements established by the Ohio EPA.

The three existing supply wells (one located in each of the North, Middle, and South areas) have depths ranging from 130 to 160 feet and have been monitored annually and semi-annually for radiological and drinking water parameters since 1970. The three existing supply wells (JN-W, JM-W, and JS-W) are sampled before the water is treated and have undergone analysis for gross alpha and gross beta emitters, fission and activation products, in addition to Ohio EPA parameters for drinking water supply evaluation. The three supply wells have consistently met water quality monitoring requirements established by the Ohio EPA.

- Battelle performed detailed chemical monitoring, and the results were reported in the *Interim Report on Site Characterization, West Jefferson North Site, Stage 1 Sampling and Analysis: Chemical Sampling Summary Report*,[19] dated December 22, 1989. The results showed the groundwater samples to be free from chemical contamination.

- Chemical sampling has been performed in three monitoring wells (C03, C09, and C16) since their installation through 2001 on an annual basis. The samples have been analyzed for eight heavy metals, 26 pesticide and PCB compounds, 36 volatile organic compounds (VOCs), 65 semi-volatile organic compounds (SOCs), oil and grease, and pH. These monitoring wells have depths ranging from 8.5 to 15 feet and have been monitored since 1989. No ground water contamination was detected in any of the wells when they were initially sampled.

- Detailed chemical analyses have been performed annually since 1991 on ground water samples from three chemical monitoring wells (C03, C09, and C16). Samples from all three wells have been analyzed for eight heavy metals, 26 pesticides and PCB compounds, 36 VOCs, 65 SVOCs, oil and grease, and pH. The shallow wells were constructed solely for monitoring purposes. Although ground water from these shallow monitoring wells does not represent site drinking water, the results are compared to U.S. EPA Primary Drinking Water Standards to put any observed concentrations in perspective.

- Well C03 showed traces of phenol at 17 parts per billion (ppb) (ug/L) during sampling for CY 1991. No traces of any chemical contaminant have been found in this well during sampling since 1991.

- Wells C09 and C16 have shown traces of bis (2-ethylexyl)-phthalate and 1,1,1-trichoroethane in an on-again, off-again pattern during the 1992-2000 sampling time frame. Various factors may account for the presence of these compounds at low concentrations ranging from 5 to 41 ppb (ug/L).

4.4 Estimated Radiation Doses to the Public

Estimates of doses to the public and workers are contained in "Finding of No Significant Impact (FONSI) and Environmental Assessment (EA)" June 1990.[14] In 2001, the EA was supplemented by the addition of current conditions and information. The DOE has maintained that the FONSI is still valid for the BCLDP. Workers' doses are not employed in the environmental surveillance and monitoring criteria and are not evaluated in estimated radiation doses to the public.

Generally the West Jefferson site falls below an estimated effective dose equivalent of 0.1 mRem (maximum non-involved Battelle staff). Hence, effluent monitoring requires only periodic confirmatory measurements; calculation of dose for normal operations, assuming that the emission controls are non-operative; and a confirmatory environmental survey at least every five years. Effluent air monitoring requires total beta and total alpha as an indicator and gamma spectrometry on an annual basis.

The filter bed area estimated radiation dose is such that an annual environmental surveillance and analysis is suggested. The estimated radiation dose to a farm family living at the outfall from consumption of crops is such that routine surveillance of all pathways is recommended. Battelle will sample farm and garden

produce in the general area of the outfall to insure that an annual effective dose equivalent of 5 mRem is not exceeded.

Table 5 represents the population distributions around the West Jefferson site. The estimated annual person-rem collective EDE within 80 km (approximately 50 miles) West Jefferson site is about 7.2 person-mRem ($3.13 \times 10^{-6} \times 2.3 \times 10^{6}$).

Based on the above, the West Jefferson site requires periodic confirmation (an estimated annual collective effective dose equivalent of less than 25 person-mRem).

Table 5. Population Within 50 Miles—West Jefferson Facility

	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 10	10 to 20	20 to 30	30 to 40	40 to 50	Total*
North	13	17	98	118	172	3,565	5,504	5,365	9,785	47,453	72,090
NNE	8	34	147	116	192	2,648	33,177	32,783	7,950	19,933	96,988
NE	13	46	76	136	581	30,040	121,109	24,423	11,754	14,779	202,956
ENE	14	257	96	200	2,386	36,041	244,383	71,416	12,862	16,441	384,096
East	309	441	130	203	4,059	41,891	247,925	133,142	25,911	76,727	530,739
ESE	769	589	219	114	332	54,788	73,058	37,024	50,406	20,607	237,906
SE	297	1,046	43	65	419	5,986	18,009	15,228	13,430	9,535	64,059
SSE	45	256	47	54	77	3,349	11,226	5,499	14,437	43,088	78,079
South	26	85	82	116	115	860	4,671	3,116	5,026	12,733	26,829
SSW	7	489	260	135	96	584	1,220	3,925	21,493	7,859	36,067
SW	2	324	2,971	514	42	806	1,019	3,647	8,812	20,209	38,346
WSW	3	24	307	126	14	1,269	9,620	5,916	19,660	173,870	210,809
West	5	23	121	173	163	694	9,880	63,943	53,643	81,331	209,977
WNW	8	14	20	36	94	1,061	3,625	17,383	7,528	7,923	37,692
NW	14	15	29	88	83	439	1,369	5,833	22,469	13,509	43,848
NNW	17	4	45	495	87	676	14,262	10,010	4,361	7,133	37,091
Total	1,552	3,665	4,692	2,689	8,912	184,696	800,056	438,653	289,527	573,131	2,307,571

* Block-level data was used in the population calculations. In cases where sector lines split blocks, the population for the block was allocated based on the proportion of the block area in that sector.

Source: 2000 Public Law 94-171, U.S. Bureau of the Census.
Prepared by: Office of Strategic Research, Ohio Department of Development. (June 2001)

4.5 Atmospheric Modeling

The present locations of air samplers at the West Jefferson site were determined through the use of meteorological modeling, which determined maximum ground level air concentrations.[20] This study was done for West Jefferson nuclear research operations and may not be appropriate for D&D activities. At the West Jefferson site, air sampler placement was checked against the EPA PTPLU model, which

calculates downwind concentrations for a set of wind speeds and stabilities after it is given values of height of emission source, emission temperature, ambient temperature, exit velocity, and emission-point diameter. Unfortunately, a copy of the original study was not available, but distances to the points of maximum ambient concentrations "were predicted by the model to be close to the West Jefferson air sampler positions for the average Port Columbus International Airport wind speed."[20,21]

In formulating this EMP, MICROAIRDOS™a, a program similar to Airdose-EPA was employed to model expected air (at ground level) and ground level concentrations out to 20,000 m, at three particle sizes (AMAD 0.2, 1, and 10 micron) and two release heights (0 and 12 m). The particle sizes were selected because corresponding inhalation data exist for these size particles,[22] and because they are thought to be the size range of particles from the subject activities that would travel a significant distance, which could cause public exposure. The two heights were selected as typical for releases during D&D activities.

Meteorological data were based on the 1950-1990 Port Columbus International Airport meteorological data, about 20 miles from the facility (CMHO243.WND). A study averaging periods one year or more indicates that the airport data are representative of frequency distributions of winds at West Jefferson.[21] A one microcurie release of radioactivity was assumed in MICROAIRDOS™ to obtain the results in terms of air concentrations (ground level) and ground deposition. Given the probable variability in particle size and release height, the modeling exercise appears to indicate that air samples at about 5,000 m from a release would be best for characterization (be subject to the least uncertainty). Furthermore, it indicates that air samples in an N direction would collect maximum concentrations, whereas those in an SE direction would have the lowest results. These latter results may be employed as a control or background sample.

4.6 Non-Radiological Contaminant Inventory

A sampling and analysis program for chemical contaminants was performed in November 1989 at the West Jefferson site. A total of 32 sampling locations provided 29 soil and 3 ground water samples for chemical analysis. During drilling operations and the subsequent collection of soil cores, some hydrocarbon contamination of soil, assumed to be fuel oil, was observed around the three fuel storage tanks on site. Further evaluation of this contamination was undertaken and remediation of this situation has been undertaken by Battelle. These tanks are not located near the BCLDP activities, and all ongoing responsibilities have been assumed by Battelle Columbus Operations (not BCLDP). PCBs were found in only one soil sample, taken close to the on-site transformer beside building JN-2, but at a ppb concentration well below the action limit of 50 ppm. Slightly elevated levels of

a MICROAIRDOSJ Ver. 2.0, Radiological Assessments Corporation, Neeses, SC. 1989.

volatile and semi-volatile compounds were detected in a sludge sample taken at the location of the storm sewer outfall. The only other contaminants, found at low ppb concentrations in a few soil samples, were several volatile organic compounds, with acetone predominant. No contamination was found in the ground water samples collected.

4.7 Implications for Effluent Monitoring and Environmental Surveillance

The number and location of effluent monitoring stations and environmental surveillance stations, the frequency of sampling, and the type and frequency of analyses are based on technical assessments that consider the following factors:

- The inventory of radioactive isotopes in each building to be decommissioned
- The potential for release of radiation and radioactive materials from the facilities into the environment
- The standard radiation protection measures to be undertaken both prior to and during D&D operations
- Applicable laws, regulations, criteria, and standards
- The capabilities and reliability of available monitoring instruments.

4.7.1 Airborne Effluent Monitoring

Environmental monitoring data collected over several years indicate no significant releases of radionuclides from the Battelle site. The small inventory of radionuclides and the distance of the West Jefferson site from major population centers reduce the potential for exposure. Sampling of aerosol concentrations in areas being decontaminated around the Battelle site, and, where appropriate, in each exhaust air stream of areas being decontaminated will provide information which will allow control of emissions.

To establish the basis for an appropriate airborne effluent monitoring system, comparisons were made between estimated BCLDP emissions and regulatory requirements.[5]

Based on the results of this comparison

- The derived dose rate to the public that may result from decontamination activities in the West Jefferson Building JN-1 is large enough to call for continuous monitoring under DOE criteria for

Emission Monitoring.[5] The details of the airborne emission monitoring plan for JN-1 are given in Section 5.2.1.

- The derived dose rate to the public that may result from decontamination activities in Building JN-2, is not large enough to call for continuous monitoring under DOE criteria for emission monitoring.[5] However, JN-2 houses Battelle's Radioanalytical Laboratory. Because of the potential for radiological emissions from laboratory operations, airborne emissions will be monitored. The details of the airborne emission monitoring plan for JN-2 are given in Section 5.2.2.

- The derived dose rate to the public that may result from decontamination activities in Building JN-3 is not large enough to call for continuous monitoring under DOE criteria for emission monitoring.[5] However, this building will be used extensively for waste management operations. The surveillance plan for JN-3 is discussed in Section 5.2.3.

4.7.2 Liquid Effluent Monitoring

Currently, liquid effluent monitoring is performed on a continuous basis at the West Jefferson site at the NPDES permitted outfall into Darby Creek. This activity will be continued. Beyond this, several years of environmental surveillance of liquid effluents at the West Jefferson site have detected no releases or exposures that approach regulatory limits. Therefore, no additional liquid effluent monitoring will be conducted. The general environmental surveillance at the West Jefferson site, which includes periodic sampling at several key liquid release pathways, will be used to keep track of radiation releases in liquid effluents (see Section 5.3).

4.7.3 General Environmental Surveillance

In addition to specific airborne and liquid emissions monitoring, general environmental surveillance of the entire West Jefferson site, following DOE criteria for environmental surveillance[5] will be employed to measure all airborne radiological releases to the environment and ensure compliance with applicable regulatory standards.

The environmental surveillance system will collect data on BCLDP emissions from numerous locations on site, at site boundaries, and off site. The current environmental surveillance program at West Jefferson is adequate to accomplish these objectives.

5.0 Location of Monitoring Stations, Frequency of Sampling, and Type and Frequency of Analyses

5.1 Effluent Monitoring Summary

The details of effluent monitoring listed in Table 6 and discussed in detail in Sections 5.2 and 5.3 meet or exceed DOE criteria and are consistent with the potential source term (see also Section 4.4). Procedures for environmental sampling and analysis are listed by title and document number in Section 6.

5.2 Airborne Effluent Monitoring

Routine airborne effluent monitoring of D&D operations within the BCLDP will be carried out in accordance with Sections 5.2.1 through 5.2.3, below, as long as such D&D activities follow the standard radiation protection procedures assumed in Section 4.7.1, "[Technical Basis for] Airborne Effluent Monitoring." The extent of airborne effluent monitoring for D&D operations will be based on a supplemental estimate of the potential airborne EDE that takes into account the local source term. For example, in a building's large open areas, where filtering room exhaust cannot be ensured, a short-term EDE would be calculated using the open area's radionuclide inventory, a room exhaust filtration factor of 1.00 (no filtration), and the duration of D&D in that area.

This plan will be reviewed and modified as necessary to comply with the goals of the EMP in the event of any change to the number or status of building air discharge points due to completion of D&D plans for the site.

Currently, radionuclide air emissions data are reported for eight stacks in the Nuclear Sciences Area that are taken together as a grouped source.[15] These discharge points comprise the 7 monitored stacks in Building JN-1 (S-1, S-2, S-3, S-4, S-5, S-6, S-7) and the one monitored discharge point in Building JN-2 (SA-11). Stacks serving the JN-1 Hot Cell Facility are designated by the DOE as Old Building (001), New Building (002), Control Area (003), Liquid Waste Evaporator (004), Basement (013), and Mechanical Test Cell (014). A single stack serves the Radioanalytical Laboratory (012).

The Environmental Monitoring Group will change out filters, conduct performance tests, and calibrate and maintain the continuous air and stack monitors at the West Jefferson North Site.

Table 6. Effluent Monitoring Program for Battelle Columbus Laboratories Decommissioning Project

Type of Sample	Sampling Site(s)	Sampling and Collection Frequency	Analysis Type and Frequency
Airborne Effluent at Point Sources,[a,b] West Jefferson Site	One in-line volumetric sampler at each active fan driven exhaust vent at Buildings JN-1 and JN-2	Continuous Sampling Weekly Collection	Total Beta and Total Alpha Weekly.[c] Gamma Spectrometry Monthly Composite.[d] U Pu Isotopic and Sr-90 Analysis on Quarterly Composite.[e]
Liquid Effluent to NPDES Permitted Outfall[f] West Jefferson	Manhole immediately following chlorinators	Daily[g] ----------	Flow Rate (24-hour total) Color Severity (observation) Odor Severity (observation) Turbidity Severity (observation) ----------
		Bi-Weekly Collection	Dissolved Oxygen (grab) Total Suspended Solids (grab) Nitrogen Ammonia (composite) Chlorine, Total Residual (grab)[h] Biochemical Oxygen Demand (composite)
		Monthly Collection	pH (grab) Fecal Coliform (grab)[h] Chloroform (grab) Alpha, Total Activity (composite) Alpha, Dissolved Activity (composite) Alpha, Suspended Activity (composite) Beta, Total Activity (composite) Beta, Dissolved Activity (composite) Beta, Suspended Activity (composite)

[a] Inactive point sources will be tagged and sealed or otherwise isolated by approved procedures prior to the start of D&D activities.

[b] The procedure for air sampling is presented in EM-SP-001.

[c] See RL-TP-005 for details of alpha and beta analysis. For air samples, if half life is greater than 30 minutes for beta and/or greater than 2 hours for alpha, send sample for gamma spectrometric analysis immediately.

[d] RL-TP-030 describes gamma spectrometric analysis.

[e] Specific Isotopic Analyses: Sr-90 RL-TP-035; Ra-226 RL-TP-025; Ra-228 RL-TP-056; Plutonium RL-TP-054; Isotopic Uranium, Am-241, and Thorium RL-TP-054; H-3 RL-TP-026; and I-129 and C-14 are analyzed off-site.

[f] NPDES-permitted outfall is for West Jefferson Laboratory wastewater discharge to Big Darby Creek.

[g] Except days when the facility is not normally staffed.

[h] Summer only (May 1 through October 31).

5.2.1 West Jefferson Site, Building JN-1

The following monitoring plan reflects the current review and status of air discharge points at the West Jefferson North Research Area, Building

JN-1. It is based on a comprehensive survey of the building areas conducted in 1992.[21]

Routine: Routine airborne emission monitoring during D&D operations at Building JN-1 will include

1) Continuous monitoring of the air discharge points (stacks), with weekly sample collection and analyses as listed in Table 6:

   (S-1 & S-2)001—Old Building (HLC, LLC)
   (S-7)002—New Building (HEC)
   (S-4)003—Control Area (CAA)
   (S-6)004—Liquid Waste Evaporator
   (S-5)013—Basement (A/G)
   (S-3)014—Mechanical Test Cell (MTC)

   The air monitoring devices shall have adjustable set points and have the capability to alarm and shutdown blowers, if the set point is reached.

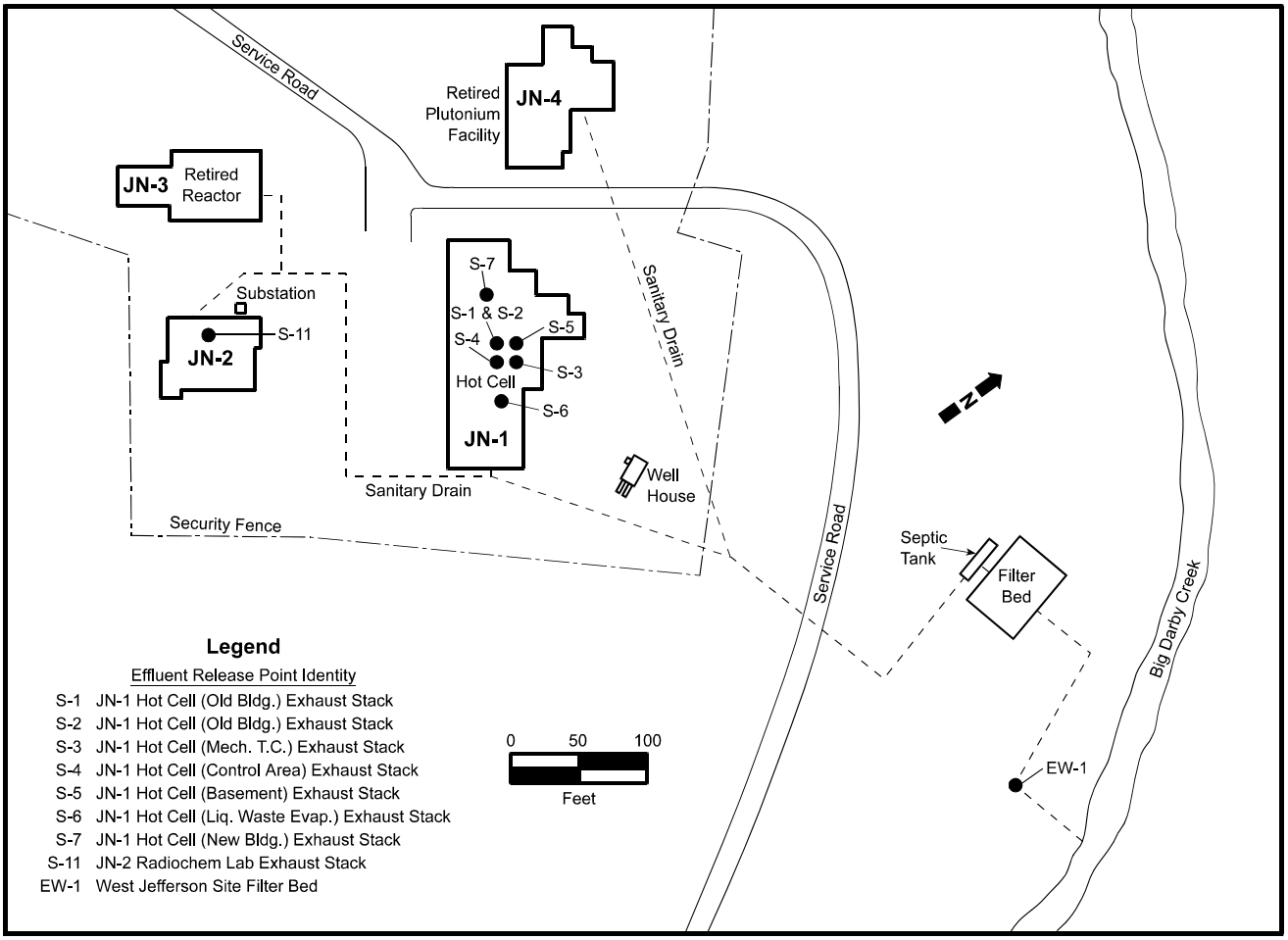
   The locations of these discharge points are shown in Figure 6. Monitoring these air discharge points will be continued until D&D of the specific area(s) serviced by a given stack are completed and the discharge point is sealed. Inactive point sources will be sealed, locked out, disabled, or otherwise isolated to ensure that inadvertent radiological releases via unmonitored pathways during D&D are prevented.

2) Prior to the commencement of D&D activities, continuous monitoring will be required for the air discharge points that are currently not being monitored[21] and have not been sealed or otherwise isolated. Any potential release points that remain active during D&D operations will need to be monitored continuously, sampled weekly, and analyzed as indicated in Table 6. Known potential release points in Building JN-1 include

   - Microprobe/SEM Lab Hood
   - Pump Room
   - Shop (Welding) Ventilation
   - Boiler Room Exhaust (3)
   - Restroom
   - Old Stack Blowers
   - Miscellaneous Air Intakes without Backdraft Control.

Contingent: In the event that air monitors or on-site environmental surveillance equipment detects levels of airborne contamination in excess of the action levels in EM-AP-2.0, procedures will be implemented immediately to correct the situation and intensify the monitoring of the building's relevant point source(s) to the extent necessary to accurately assess the amount of contamination released. Intensified monitoring will continue until measurements show that airborne effluents are within BCLDP action levels.

Figure 6. North Research Area—West Jefferson Site



5.2.2 West Jefferson Site, Building JN-2

The following monitoring plan reflects the current review and status of air discharge points at the West Jefferson North Research Area, Building JN-2. It is based on a comprehensive survey of the building areas conducted in 1992.[21]

Routine: Routine airborne emission monitoring during D&D operations at Building JN-2 will include

1) Continuous monitoring of the air discharge point (stack) that is currently being monitored, with weekly sample collection and analyses as listed in Table 6:

   (S-11)012—Radioanalytical Laboratory (RAL)

   The location of this discharge point is shown in Figure 6. Monitoring of this air discharge point will be continued until D&D of the specific area(s) serviced by a given stack is completed and the discharge point is sealed. Inactive point sources will be sealed, locked out, disabled, or otherwise isolated to ensure that inadvertent radiological releases via unmonitored pathways during D&D are prevented.

2) Prior to the commencement of D&D activities, continuous monitoring will be required for the air discharge points that are currently not being monitored and that have not been sealed or otherwise isolated.[21] Any potential release points that remain active during D&D operations will need to be monitored continuously, sampled weekly, and analyzed as indicated in Table 6. Known potential release points in Building JN-2 include

   - Hood in Room 2106
   - Hood in Room 2108
   - Drying Oven Fume Hood
   - Boiler Room Exhaust (2)
   - Restroom
   - Miscellaneous Air Intakes without Backdraft Control
   - Vault
   - High Bay

Contingent: In the event that air monitors or on-site environmental surveillance equipment detects levels of airborne contamination in excess of the action levels in EM-AP-2.0, procedures will be implemented immediately to correct the situation and intensify the monitoring of the building's relevant point source(s) to the extent necessary to accurately assess the amount of contamination released. Intensified monitoring will continue until measurements show that airborne effluents are within BCLDP action levels.

5.2.3 West Jefferson Site, Building JN-3

There are presently no operational air emission monitors at Building JN-3.

Routine: Continuous airborne effluent monitoring of the point sources (vents, stacks, blowers, etc.) on the exterior of Building JN-3 will not be performed. The technical basis for this determination rests on results of calculations, shown in Section 4.7.1, that show the small radionuclide inventory in the building, coupled with standard D&D radiation protection procedures,[14] leading to substantially less than 0.1 mrem/year EDE (the DOE criterion for continuous monitoring).

Contingent: In the event that either recalculation of the EDE for non-standard D&D procedures exceeds 0.1 mrem/year, or in-building air monitors or on-site environmental surveillance equipment detects above-standard levels of airborne contamination, procedures will be implemented immediately to intensify monitoring of the building's relevant point source(s). Intensified monitoring will continue until measurements show that airborne effluents are below applicable regulatory standards.

5.3 Liquid Effluent Monitoring

Presently, a waste water treatment system, operated under an NPDES permit in accordance with State of Ohio regulations under 41N00004*GD, handles all wastewater generated on the West Jefferson North site. Sampling of all waste water liquid effluents from the North Research Area to Big Darby Creek is performed using a continuous water sampling system located after the discharge from the UV disinfection tank. Various parameters are measured on daily, weekly, bi-weekly, or monthly schedules (see Table 5). The station, shown as EW-1 in Figure 6, will continue to be monitored during D&D operations. However, based on long-term measurements of liquid effluents from the West Jefferson site and assessments of potential liquid releases from D&D activities (see Sections 4.3.2 and 4.3.3), potential liquid emissions during D&D will be far below regulatory thresholds that would require continuous monitoring. Therefore, additional liquid effluent monitoring will not be conducted at West Jefferson. Detection of radiological releases in liquid effluents will be covered by the environmental surveillance program at the West Jefferson site.

Should action levels be detected in liquid samples, an immediate investigation regarding the reasons for the source terms causing the release shall be performed; and will be suspect operations suspended until corrective actions have been performed.

5.4 Environmental Surveillance

The EMP for the West Jefferson Site Environmental Surveillance Program is presented in Table 7. It is designed to meet and/or exceed the DOE requirements for environmental surveillance.

Locations of monitoring and sampling locations at the West Jefferson site are shown in Figures 7, 8, and 9. Figure 7 shows current and planned sampling locations for on-site air, water, and sediment sampling, except TLDs. Figure 8 shows the locations of the 16 TLDs distributed on and around the West Jefferson site. Figure 9 shows grass, food crop, and soil sampling locations off site.

Sample collection frequency and the types and frequency of analyses to be performed are listed in Table 7 and in the specific procedure documents referenced in the table.

Table 7. Environmental Surveillance Program for Battelle Columbus Laboratory West Jefferson Site

Sampling Type	Sampling Site(s)	Collection Frequency	Analysis Type and Frequency
Airborne Particulates	Locations as described in EM-OP-002	Continuous Sampling, Weekly Collection	Total beta and alpha on weekly.[a] Gamma spectrometric analysis on monthly composite.[b] Isotopic U, Pu, and Sr-90 on quarterly composite.[c]
Airborne Particulates	Sites as described in EM-SP-001	Continuous Sampling, Weekly Collection	Total beta and alpha on weekly.[a] Gamma spectrometric analysis on quarterly composite.[b] Isotopic U, Pu, and Sr-90 on quarterly composite.[c]
Liquid Samples	Sites as described in EM-SP-002	Weekly Sample Collection	Total beta and alpha on weekly.[a] Gamma spectrometric analysis on monthly composite.[b] U, Pu, and Sr-90, on quarterly composite.[c] C-14 and H-3 when appropriate.
Drinking Water	Onsite in building JN-2 or JN-3	Weekly Sample Collection	Total beta and alpha on monthly composite.[a] Gamma spectrometry on quarterly composite.[b] U, Pu, Sr-90, Ra-226, Ra-228, I-129 on annual composite[c]. C-14, H-3 when appropriate. (Data used to provide site background values.)

Table 7. Environmental Surveillance Program for Battelle Columbus Laboratory West Jefferson Site (continued)

Sampling Type	Sampling Site(s)	Collection Frequency	Analysis Type and Frequency
Ground Water	See ground water sampling (discussed in Section 4.3.4)	Semi-Annual Sample Collection	Total beta and alpha,[a] gamma spectrometry[b] and U, Pu, and Sr-90 on Semi-Annual Sample.[c] C-14, H-3 when appropriate. Total metals: Ag, As, BA, Cd, Cr, Hg, Pb, Se, volatile organic compounds, semi volatile compounds, pesticides and PCBs, oil and grease, and pH for selected chemical wells on an annual basis.
Ground Water	See ground water sampling (discussed in Section 4.3.4)	Annual	Total beta and alpha, gamma spectrometric U, Pu, and Sr-90. PCBs.
Soil	As described in EM-SP-003	Annual Sample Collection	Gamma spectrometry.[b] U, Pu, and Sr-90, on annual sample.[c]
Vegetation	As described in EM-SP-004	Annual Sample Collection	Gamma spectrometry.[b] U, Pu, and Sr-90, on annual sample.[c]
Sediment	As described in EM-SP-011	Semi-annual Sample Collection	Total beta and total alpha,[a] gamma spectrometry,[b] U, Pu, and Sr-90 on semi-annual sample.[c]
Fish or Mollusks	See EM-SP-007	Annual Sample Collection	Total beta and total alpha,[a] gamma spectrometry,[b] U, Pu, and Sr-90 on annual sample.[c]
Field Corn and/or Soybeans	As Described EM-SP-005	Annual Sample Collection	Gamma spectrometry.[b] U, Pu, and Sr-90 on annual sample[c].
Garden Crops	See EM-SP-006	Annual Sample at End of Growing Season	Gamma spectrometry.[b] U, Pu, and Sr-90 on annual sample.[c]
Beta-Gamma External (TLD)	See EM-SP-008	Quarterly Collection	Read quarterly.

[a] See RL-TP-005 for alpha and beta analyses. For air samples, if half life is greater than 30 minutes for beta and/or greater than 2 hours for alpha, send sample for gamma spectrometric analysis immediately.

[b] RL-TP-030 describes gamma spectrometric analysis.

[c] Specific Isotopic Analyses: Sr-90: RL-TP-035; Ra-226: RL-TP-025; Ra-228: RL-TP-056; I-129: Analyzed off-site; Plutonium, Isotopic Uranium, Am-241, and Thorium: RL-TP-054; C-14: Analyzed off-site; H-3: RL-TP-026

Figure 7. Map of Site Air, Water, and Sediment Sampling Locations

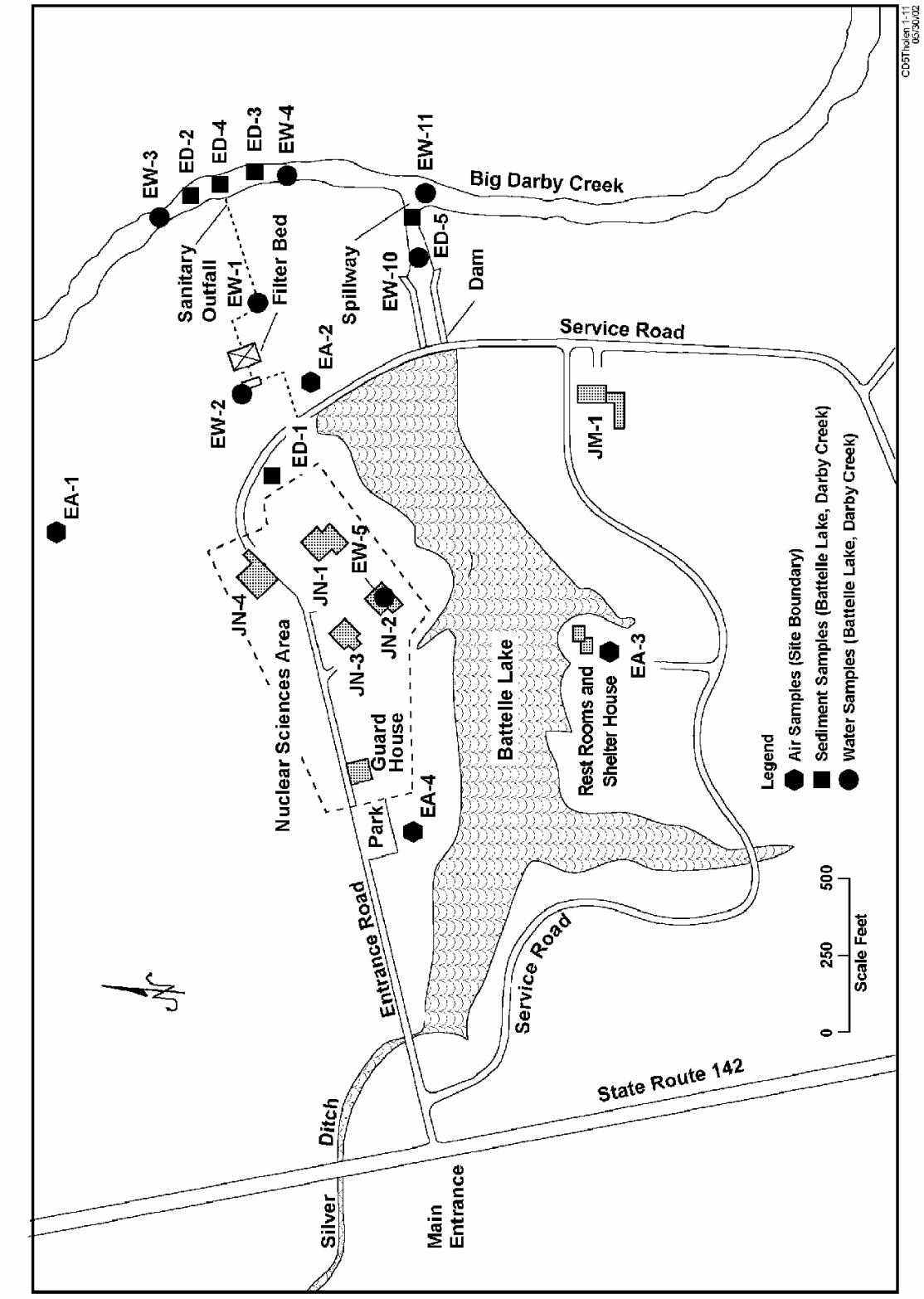


Figure 8. Map of TLD Locations within Three-Fourth-Mile Radius of the North Research Area

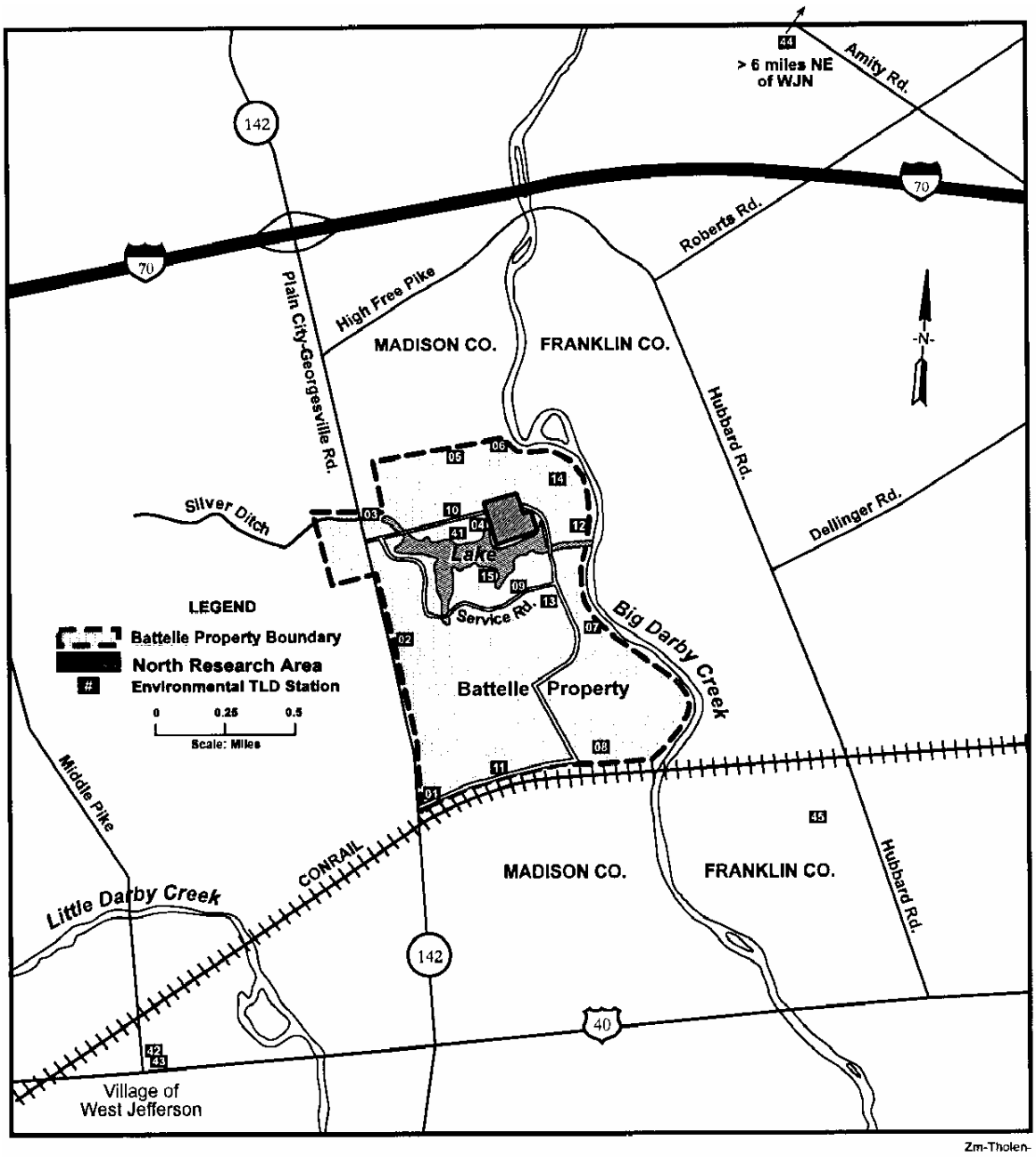
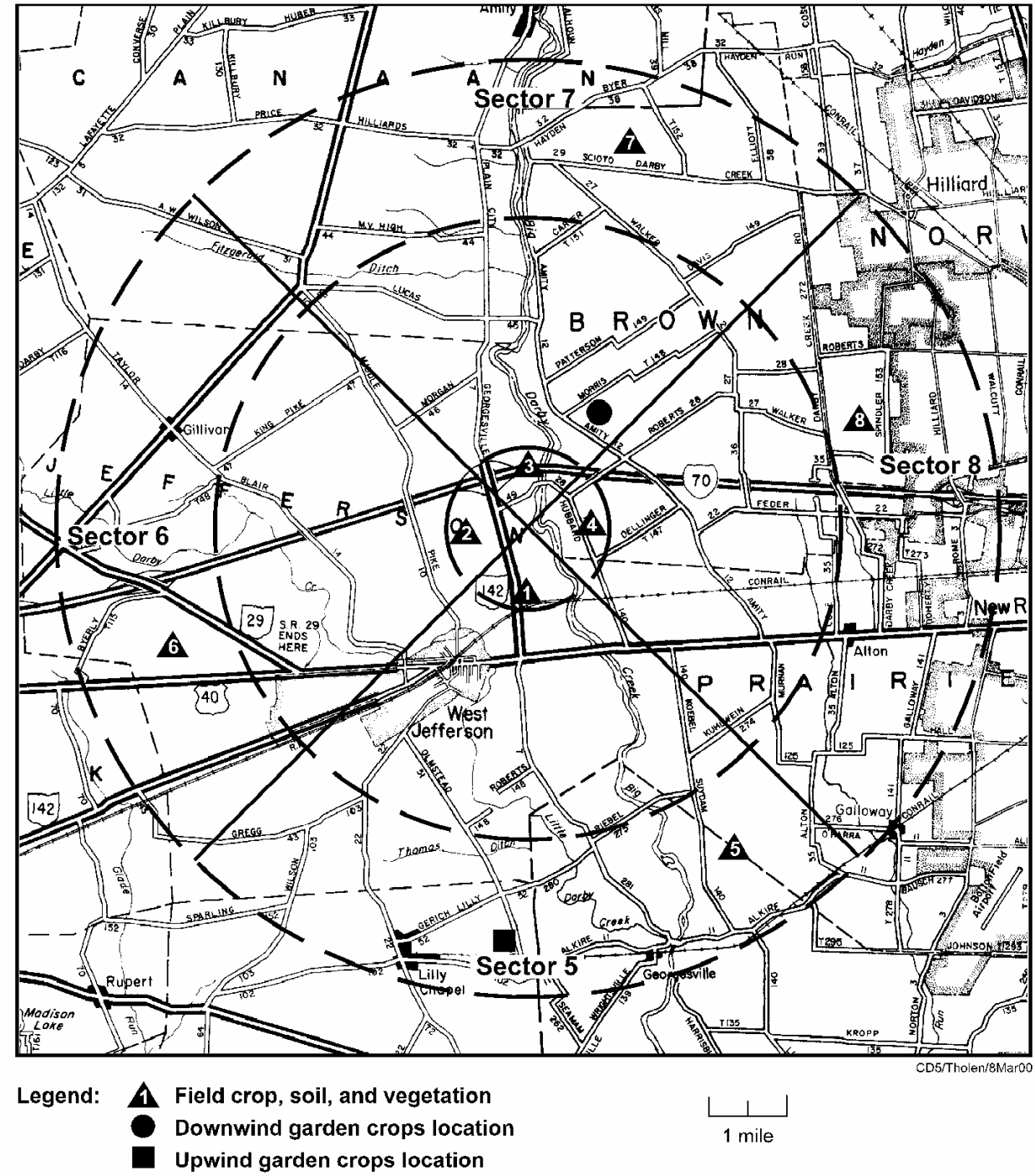


Figure 9. Map of Grass, Food Crop, and Soil Sampling Locations



5.5 Integration and Data Sharing Among BCLDP and other Environmental Monitoring Organizations at Battelle

Large amounts of radiological monitoring and surveillance data will be generated during the course of the BCLDP. At the same time, other organizations within Battelle will collect their own radiological samples and produce data principally for their own use. To minimize duplication of effort and to take maximum advantage of available information that could be used by any Battelle group in their environmental, health, and safety programs, the BCLDP will develop plans and procedures to integrate its data acquisition, storage, and dissemination activities with other Battelle groups. See Section 9.4 for more detail on implementation.

5.6 Integration of Battelle Columbus Laboratory Emergency Management Plan into the Environmental Monitoring Program

An EMP requires flexibility so that the information gathered can be of use should a radiological accident involving the escape of radioactive materials occur. Conversely, the site's emergency plan can provide backup to the EMP, particularly in terms of emergency effluent monitoring. The Nuclear Regulatory Commission in its "Emergency Environmental Sampling and Analysis for Radioactive Material Facilities"[7] specifically describes environmental sampling and analysis in a radiological emergency.

Battelle's Columbus Operations emergency plans for a radiological emergency at the West Jefferson site will provide supplementary information on effluent monitoring in case of a radiological emergency.

6.0 Sampling and Analyses Methodology and Determination of Off-Site Impact and Consequence Assessments

6.1 Sampling and Monitoring

The following procedures will describe sampling and monitoring activities.

Title	Document No.
Operation and Calibration of the Eberline AMS-4 Beta Particulate Monitor	EM-OP-001
Collecting and Processing Filters from Stack and Area Continuous Air Monitors	EM-OP-002
Collection of Environmental Air Samples for Radiological Analysis	EM-SP-001

Collection of Environmental Water and Liquid Effluent Samples for Radiological Analysis	EM-SP-002
Collection of Environmental Soil Samples	EM-SP-003
Collection of Perennial Vegetation Samples—Grass or Other Ground Cover, Trees and Shrubbery	EM-SP-004
Collection of Annual Crop Samples	EM-SP-005
Collection of Environmental Vegetation Samples—Garden Crops	EM-SP-006
Collection of Environmental Fish Samples	EM-SP-007
Beta-Gamma Radiation Monitoring	EM-SP-008
Collection of Environmental Groundwater Samples	EM-SP-009
Collection of Environmental Sediment Samples	EM-SP-011
Sampling of Sediment and Sludge for Chemical and Radiological Characterization	SC-SP-006

6.2 Analyses

The following procedures will describe the analyses of samples.

Title	Document No.
Preparation of Environmental Water and Air Samples and Routine Smears for Gross Alpha and Beta Counting	RL-TP-005
Gross Alpha and Gross Beta Counting of Soil/Sediment/ Sludge Samples Using the Tennelec LB5100	RL-TP-007
Gross Alpha and Beta Analysis Using the Tennelec LB5100 Low Background System	RL-TP-020
Analysis of Radium-226 in Environmental Water and Soil Samples	RL-TP-025
Analysis of Tritiated Water and Screening for Low Beta Energy Emitters by Liquid Scintillation Counting	RL-TP-026
Gamma Spectrometric Analysis of Laboratory Samples Using Canberra Procount™ Software	RL-TP-030
Strontium-90 Analysis by Extraction Chromatography	RL-TP-035
Determination of Actinides in all Sample Matrices	RL-TP-054

Analysis of Radium-228 in Water Using U.S. EPA Method 9320/SW-846	RL-TP-056
Gross Alpha and Gross Beta Analysis of Water Using U.S. EPA Method 9310/SW-846	RL-TP-057

6.3 Chain-of-Custody Procedures for Handling Environmental Samples

To ensure proper handling, transfer, and accountability for all samples submitted for analysis under the EMP, the chain-of-custody procedures listed in RL-AP-1.0, Administrative Operating Procedure for the Radioanalytical Laboratory, will be followed.

6.4 Data Analysis and Statistical Treatment of Data

Effluent monitoring and environmental measurements obtained from sampling and analysis shall be analyzed to compare them to the appropriate environmental standards (Section 2), discern spatial and temporal trends, and eliminate outliers from further statistical analysis. All environmental data obtained through monitoring shall be noted. Data values will be reported as minimum detectable activity (MDA), when activity is at or below MDA.

Comparisons of effluent monitoring and environmental surveillance data shall be made each month to indicate trends in radioactive levels. This includes analysis of all information that is capable of indicating such trends. This requirement does not negate the need for daily vigilance and inspection to determine the efficacy of effluent controls.

Determination of the less-than-detectable values is the subject of numerous statistical methodologies. Given that natural background radiation is ubiquitous, and that sources other than the site may contribute to the resultant radioactivity, the criteria employed in this EMP is that detectable levels attributed to D&D activities shall be that amount equivalent to background levels of radioactivity in the environment from other sources. Sampling and analysis techniques conform to this criteria.

Most environmental data follow a normal distribution. Hence, the central tendency of the data shall be expressed as the median value and the variance as the geometric standard deviation. The range of values shall be characterized as falling between the 5th and 95th percentile.

A test of normality shall be performed on groups of ten or more data points. Plotting data on normal or log-normal probability paper is the simplest method of determining normality.

If the data is normal rather than log-normal, the mean shall be the measure of the central tendency and the standard deviation a measure of variance.

If data is sparse, different assumptions about the distribution of the data may be made and an appropriate statistical analysis employed to determine the range and uncertainty of the data.

To determine spatial and/or temporal trends, comparison of data points or groups of data is required. This type of comparison is also required in comparing monitoring results to environmental standards. Plotting the data on graph paper is often sufficient to elucidate trends over time or differences between sampling locations. Use of parametric and nonparametric statistical techniques shall be employed for groups of data to determine if significant differences exist between them.

Outliers for the purposes of this EMP shall be values more than three standard deviations from the mean (or three geometric standard deviations from the median).

The Annual SER shall summarize the results if statistical analyses become necessary for values greater than MDA.

6.5 Determination of Off-Site Impact and Consequence Assessments

10 CFR 20.1101, *Radiation Protection Programs*,[23] puts forth a constraint on airborne emissions of radioactive material to the environment, excluding Ra-222 and its daughters, such that an individual member of the public likely to receive a total effective dose equivalent (TEDE) in excess of 10 mRem per year from these emissions.

A constraint is a dose value above which licensees are required to report to the NRC and to take corrective actions to lower the dose below the constraint value. Enforcement action would only occur if a licensee fails to report the constraint is exceeded or fails to take appropriate and timely corrective actions.

Reg Guide 4.20, *Constraint on Releases of Airborne Radioactive Materials to the Environment for Licensees other than Power Reactors*, Section c.2.4[24] states that the computer code COMPLY is acceptable to the NRC staff for determining the dose to members of the public from exposure to airborne radioactive materials that have been released to the environment by NRC licensees other than power reactors.

Battelle demonstrates compliance with 10 CFR 20.1101(d)[23] by using the COMPLY computer code, version 1.5d.

7.0 Meteorological Monitoring Program

At the present time, Port Columbus International Airport meteorological data are used for the West Jefferson site. Battelle investigated the meteorology and siting of the wind measurement instrument at the West Jefferson site in 1991 compared to that at Port Columbus.[20]

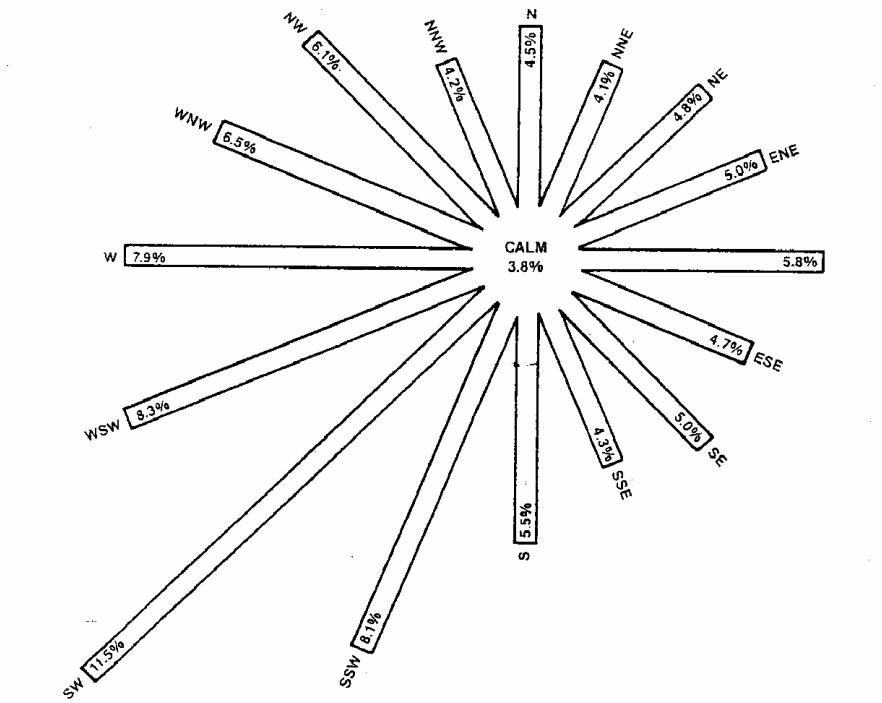
The author of the study concluded that "the Port Columbus wind climatology, at least for averaging periods of one year or more, is representative of the frequency distributions of winds at West Jefferson."[20]

As shown in Table 8, the predominant wind direction at West Jefferson is southwest, and the next two most frequent wind directions are west-southwest and south-southwest. Figure 10 shows the wind rose pattern for the West Jefferson site.

Table 8. Average Percent Frequency of Wind Direction (Wind From) and Average Wind Speed for CY 1990

Direction	Percent	Average Speed (m/s)
N	4.5	4.7
NNE	4.1	4.2
NE	4.8	4.0
ENE	5.0	4.1
E	5.8	4.4
ESE	4.7	3.8
SE	5.0	4.3
SSE	4.3	3.8
S	5.5	4.5
SSW	8.1	4.9
SW	11.5	5.5
WSW	8.3	5.3
W	7.8	5.1
WNW	6.5	4.9
NW	6.1	4.6
NNW	4.2	4.2
CALM	3.8	—
TOTAL	100.0	4.5

Figure 10. Wind Rose Pattern (Wind from) for West Jefferson Site



8.0 The Environmental Monitoring Plan's Quality Assurance Program

8.1 Overview

The current SER notes that a DOE quality assessment program is being administered by the DOE's Environmental Measurements Laboratory (EML).[25] The BCLDP in-house Radioanalytical Laboratory is a participant in the EML's quality assessment program. Therefore, it is appropriate that the Quality Assurance Program (QAP) employed by the EML be a pertinent part of this Environmental Monitoring Plan.

The EMP shall be reviewed annually. Specific sampling and analytical procedures shall be reviewed and revised if necessary every two years.

The QAP, under which the RAL and EM operate, includes laboratory certification, a DOE QAP for radioactive materials, and independent data verification. This quality program does not include definitive procedures for quality assurance for non-radiological monitoring.

8.1.1 Laboratory Certification

Only certified laboratories will be contracted for analysis work. Sample analysis will be performed by applicable standard methods and covered

under the Battelle QAP. Before hiring a contractor to do environmental sample analysis, the EM Manager and the Quality Manager will ascertain that the contractor is properly accredited by such bodies as the EPA or State of Ohio.

Currently the EM Group uses both contractor laboratories and in-house facilities for both organic and inorganic chemistry and radiological work. These in-house labs are approved for analysis through adherence to accepted procedures. In-house radiological analysis is performed in the RAL. This laboratory participates in the DOE EML Quality Assurance Program. Both of these laboratories are under Battelle's QAP. Only outside laboratories that have been approved for EPA analysis are used for outside chemical analysis. General Engineering Inc. is used as a backup to the in-house radiological analysis. The RAL has performed analyses on the EML samples for Battelle in the past as proof of its qualification. A contract will be negotiated with another off-site laboratory to provide back-up capabilities for both radiochemical and non-radiochemical parameters during the period of D&D activities.

8.1.2 DOE Laboratory Quality Assurance Program for Radioactive Materials

Battelle and the vendor(s) responsible for the analyses of Battelle samples in support of the environmental radiological programs will participate in the DOE interlaboratory quality assurance program (coordinated by the DOE Environmental Measurements Laboratory in New York).

8.1.3 Independent Data Verification

On August 21, 1989, DOE Secretary Watkins, as part of his 10-point initiative of June 27, 1989, announced a comprehensive program to enter into agreements with eleven states "...to provide direct access and enhance environmental monitoring by the states at the department's facilities." The Secretary's initiative satisfies DOE Order 5400.1 requirements for independent data verification.

BCLDP is committed to the maintenance of an effective quality assurance program. The national consensus standard of the ASME is adopted as the preferred standard for quality assurance in the nuclear area.[9]

An important aspect of the BCLDP QAP is the written documentation of quality assurance and quality control procedures that are used in the EMP. This documentation is described in this section. Under normal circumstances, all environmental monitoring reports contain a section in which the quality assurance procedures and the results are discussed. For a

QAP to be effective, corrective action must always be taken when substandard results are detected, and subsequent follow-up audits must be made to verify that any problems have been solved.

8.2 Definitions

Three definitions related to quality assurance practices are given below.

Definitions of quality assurance, quality control and assessment/appraisal are given by DOE Order DOE 414.1A.[2]

- **Quality assurance** involves all those planned and systematic actions necessary to provide adequate confidence that a facility, structure, system, or component will perform satisfactorily and safely in service.

- **Quality control**, which is included within quality assurance, comprises all those actions necessary to control and verify the features and characteristics of a material, process, product, or service to specified requirements.

- **Assessment/appraisal** is a planned and documented activity performed in accordance with procedures to determine, by examination and evaluation of objective evidence, the adequacy of, and extent to which, applicable elements of the quality assurance program have been developed, documented, and effectively implemented in accordance with specified requirements.

8.3 Field Measurements and Sampling

The sampling procedures for field measures and sampling will incorporate quality control standards and techniques. The activities included are field sampling; preparation and storage of samples; coding and record keeping; handling, storage, and shipping; and sample archiving.

8.4 Radiochemical Analyses

Quality control standards and techniques for radiochemical analyses are found in RL-QAP-01.0, Radioanalytical Laboratory Quality Assurance Program Plan, and the Radioanalytical Laboratory procedures.

8.5 Instrumental Analyses

Instruments used by the RAL are maintained, calibrated, and stabilized by the RAL using their calibration and test procedures.

8.6 Data Reduction, Storage, and Reporting

The reduction, storage, and recording of analytical data from the RAL is performed through RL-AP-01.0, Administrative Operating Procedures for the Radioanalytical Laboratory and the RAL testing procedures.

8.7 Quality Assurance Records

Records that furnish documentary evidence of quality shall be specified, prepared, and maintained. Specified records include, but are not limited to, the following:

a) Maps identifying sampling locations
b) Sampler record book
c) Sample inventory
d) Technical procedures and data sheets
e) Calculation and analyses records
f) Reports
g) QA surveillance and audit records
h) Program correspondence

Records shall be made part of the BCLDP record management system on a periodic basis.

9.0 Implementation of the Environmental Monitoring Plan

9.1 Environmental Monitoring Plan Implementation

The BCLDP EMP has been developed primarily for the radiological surveillance and maintenance portion of the BCLDP and is currently under the direction of the Environmental Monitoring Manager. This plan has been written to reflect guidance on environmental monitoring published by DOE. The plan will be reviewed annually and updated every two years as required by Order 5400.1 until the contract is terminated. The annual review and biennial updates to the plan will be prepared by the BCLDP Environmental Monitoring Group and reviewed by the Quality Manager and the BCLDP Radiological Technical Support Manager prior to submittal to Ohio Field Office for review.

The Environmental Monitoring Program will follow the guidance of Ohio Field Office in implementing the DOE 5400 order series, just as it has in the past. This includes adherence to the relevant standards given in existing DOE orders. The emphasis in the rationale for monitoring radiological pollutants is placed on potential environmental exposure pathways appropriate to source material, fission products, and activation products used in research. The radiological pathways include both external and internal exposure.

The environmental monitoring activities have two major phases. The first phase consists of characterizing sources of pollution, including radiological and non-radiological measurements and sampling near the sources. The second phase of the plan includes analysis of pathways to the site boundary and off-site environmental sampling to substantiate the effectiveness of the control of releases. This plan includes measurements and samples taken near the surface (including air monitoring), surface water, and ground water monitoring consisting of measurements taken from a network of wells. Meteorological and hydrological data are acquired as necessary to support this plan. The quality assurance program to control the EMP is discussed in Section 8.1.

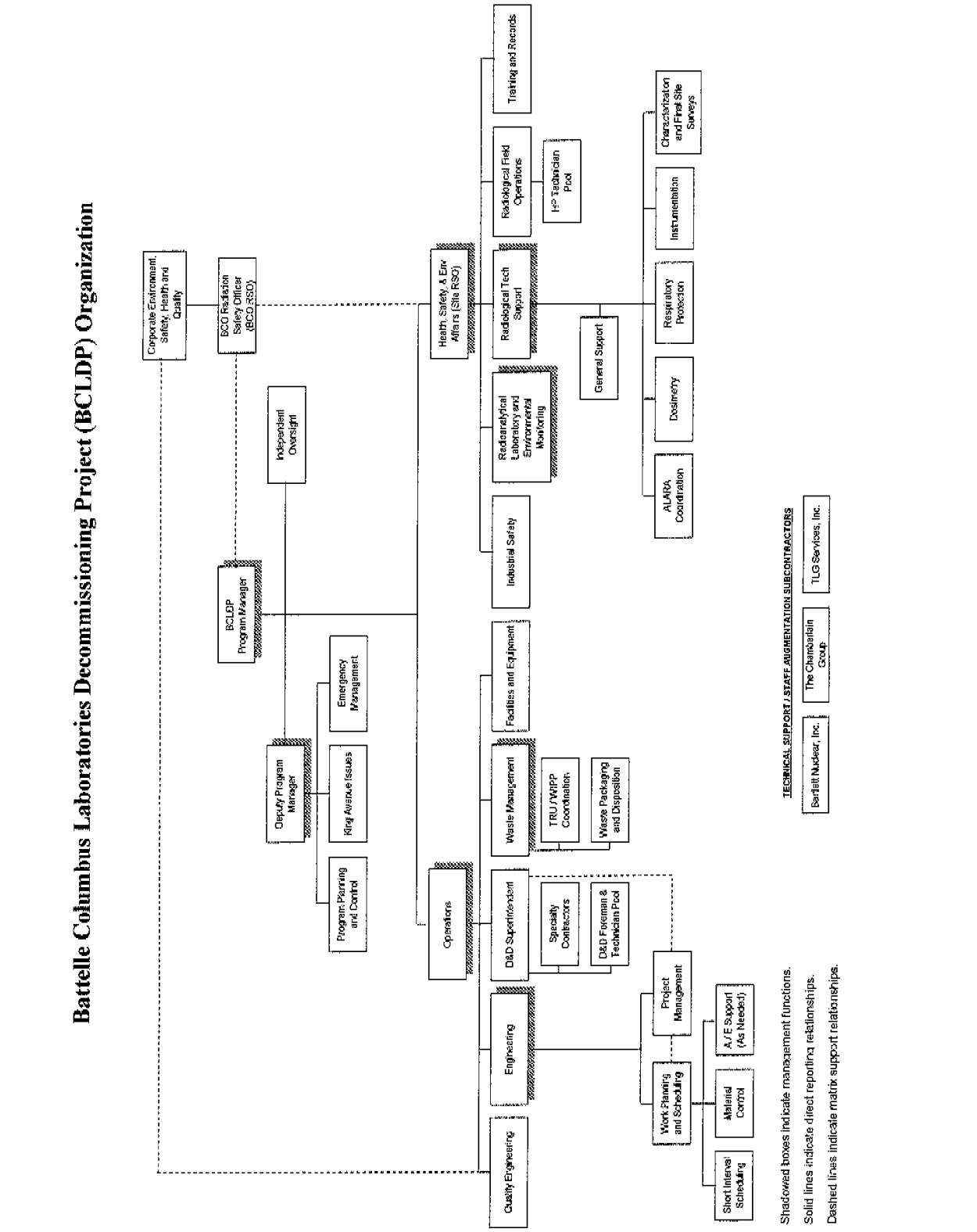
9.2 Environmental Monitoring Activities

Monitoring data are collected and analyzed to determine compliance with applicable regulations, are maintained by the BCLDP Environmental Moniroting Group and submitted as appropriate to the Ohio Field Office. The BCLDP Environmental Monitoring Group is responsible for implementing the EMP, doing the field work, and directing the laboratory analysis. Environmental monitoring and environmental occurrence reporting requirements (including reports for radioactive effluent, on-site discharge, and unplanned releases) are already coordinated through the BCLDP Environmental Monitoring Group. This group reports the monitoring data in accordance with federal, state, and local regulatory requirements. The actual reporting is done through the Environmental Monitoring Manager, with copies going to the Ohio Field Office.

The organizational structure for various tasks described in the EMP is shown in Figure 11. Each manager reports directly to the BCLDP Program Manager and is responsible for the day-to-day monitoring activities, equipment calibration, and review and evaluation of data generated.

NOTE: Changes associated with the Radiation Protection Program in the latest organization chart will not be implemented until NRC approval is acquired, as evidenced by their issuance of an amendment to License SNM-7.

Figure 11. D&D Operations Organization Chart



9.3 Ground Water Protection Monitoring

Monitoring for radionuclides in 21 wells around the West Jefferson site is in accordance with DOE Orders in the 5400 series. The BCLDP Environmental Monitoring Group coordinates this effort. The ground water monitoring program summarized herein is intended to meet the requirements of Chapter IV, paragraph 9, of DOE Order 5400.1.[3] Many of the wells used in the ground water monitoring program were designed in accordance with 40 CFR Part 264, Subpart F, or 40 CFR Part 265, Subpart F[22] as part of site characterization of the West Jefferson site.

Additional ground water monitoring is done at a supply well for the West Jefferson Nuclear Science Area and from two other existing supply wells before the water is treated in any form. 18 wells have been installed for sampling around the West Jefferson site and are being used for monitoring radionuclides; three of these wells are also monitored for chemical contamination.

9.4 Integration and Data Sharing among BCLDP and other Environmental Monitoring Organizations at Battelle Memorial Institute

Large amounts of radiological monitoring and surveillance data will be generated during the course of the BCLDP. At the same time, other organizations within Battelle will collect their own radiological samples and produce data principally for their own use. To minimize duplication of effort and to take maximum advantage of available information that could be used by any Battelle group in their environmental, health, and safety programs, the BCLDP will develop plans and procedures to integrate its data acquisition, storage, and dissemination activities with other Battelle groups.

Data obtained from monitoring effluents and from environmental surveillance during BCLDP operations will be formatted in accordance with a data reporting procedure (to be written). The data reports will be distributed either by hard copy, or, preferably, via Battelle's electronic communications network, to BCLDP and other Battelle groups, including, but not limited to

- Radiological Field Operations (BCLDP)
- Radiation Safety (BCO)

Conversely, BCLDP will work with other Battelle groups to set up procedures by which their data can be acquired easily for use by BCLDP.

10.0 Reports and Notification

DOE 5300.1 requires preparing a pre-operational environmental assessment before starting a project (such as D&D) that has the potential for an adverse environmental impact or which will process, release, or disperse radioactive material.

DOE informed Battelle that the finding of no significant impact and the environmental assessment concluded that the National Environmental Protection Act required cleaning up Battelle Columbus sites.[26] BCLDP was informed at the same time that it was required to give public notice of these documents in accordance with Section 1505.6(b)(3) of the Council of Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA.[26]

This same order requires a written EMP. This document constitutes the EMP. It contains the rationale and design criteria for the monitoring program, describes the extent and frequency of monitoring and measurements, and describes the preparation and disposition of reports. The plan will be reviewed annually and updated as needed, at least every three years.

DOE 5400.1 calls for the submission of an annual report (the SER) in accordance with Section II of the "Effluent Information System and Oversite Discharge Information System User's Manual (EIS/ODIS)."[27] Reports covering the previous calendar year will be submitted to the DOE by October 1 and distributed to other appropriate agencies and offices. An Executive Summary shall be included in the SER in accordance with the requirements of DOE 5400.1.

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